Consumer Attitudes Towards Packaging and Packaging Waste

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1.0 Introduction

Packaging is ubiquitous in our daily lives and has become a top-of-mind issue for the public, policy makers and producers alike. While packaging plays a vital role in minimizing food waste, increasing product durability, reducing contact contamination, and increasing shelf life both at the store and in the home, packaging waste has become symbolic of a culture that espouses linear forms of consumption. Millions of tonnes of single use packaging waste are entering into our landfills, oceans and environment every year, necessitating that we take immediate steps to ensure that we are able to minimize and effectively divert packaging waste. Public interest and awareness regarding waste management and sustainability in general is at an all-time high. Now more than ever, the public is demanding more effective solutions to not only manage waste, but that products and their packaging are designed specifically with sustainability in mind.

Numerous studies over the past 3 years have shown that the environmental impact of a package or product is now being factored into consumer purchasing decisions. These studies have shown that consumers self-report as having a preference for products that are characterized as being "good for the environment" (i.e. readily recyclable at end of life), and are also willing to pay a premium for these products. Consumers are also expressing greater concern surrounding the environmental impact of their purchasing decisions, and have identified plastic waste, litter and excess packaging as being priority areas of concern.

In response to these concerns, both policy makers and producers have committed to the reduction of packaging waste using the following strategies: Legislatively mandated recycling and recycled content targets, development of new infrastructure to effectively manage packaging waste, and in the case of single use plastics, outright bans depending on the product category in question. However, conversations surrounding packaging waste, and single use plastic packaging often lack nuance. On aggregate, people have a propensity to view plastic and excess packaging as "bad", particularly materials that possess low levels of recyclability. The vilification of packaging waste is why we have seen a concerted effort from all sectors to move away from single use packaging in favor of items that are perceived to be more sustainable.

But is this the right approach? How much does the public, policy makers and producers fully understand about how product packaging affects end of life outcomes and its overall environmental impact? As a tangent to this, who should bear the responsibility for how much onus should be placed on an individual to make sustainable packaging choices? And to what degree do people have economic agencies in making purchasing decisions based on packaging design (or environmental impact as a whole)?
This study seeks to gain a better understanding of these issues by undertaking a comprehensive examination of the motivators and barriers to effective end of life management to packaging waste.

This includes:

- Consumer perception of environmental impact (both positive and negative) based on end-of- life waste management outcomes (i.e. recycling vs. reduction)
- Consumer perception of environmental impact based on the words /phrasing that are used to describe packaging waste and end of life outcomes (i.e. advanced/chemical recycling). This includes a sensitivity analysis of how individual preferences change in response to changes in words/phrasing (i.e. compostable packaging vs. compostable plastics)
- Consumer attitudes towards packaging descriptions and producer claims surrounding product recyclability/composability
- Consumer preferences for packaging design and end of life waste management outcomes. This includes self-reported measures of whether consumers are willing to pay more for products perceived to be more environmentally sustainable.
- Levels of consumer awareness surrounding commonly used key phrases, terms and key performance indicators (used to describe packaging/product design and waste)

- Consumer awareness surrounding policy/legislative objectives developed by local government
- Consumer support for policy/legislative objectives developed by local government (i.e. zero waste city by 2025)

In addition to the above, one of the primary goals of this study is to better understand how to effectively communicate with range of stakeholders on issues related to packaging, packaging waste, sustainability and stewardship. Consumers, producers and even policy makers often lack a meaningful understanding of waste related concepts and terms, and as such, it is imperative that we find ways to develop the appropriate "language" that can be used to communicate sustainability issues in a way that resonates with the intended audience.

Where possible, survey results were compared with studies conducted in prior years, as a means to establish a temporal dimension to the analysis and determine whether attitudes/behaviors have shifted over time. It should be noted that the emergence of the COVID pandemic last year has added an additional dimension to issues surrounding packaging and packaging waste, as the way we work, interact, consume and behave has undergone unprecedented changes in a relatively short period.

1.1 Study Methodology

This study used a mixed methods research approach, utilizing in-person interviews, consumer focus groups, and structured surveys.

Survey participants represented households from both the United States and Canada - a stratified sampling strategy was used to ensure that study participants were representative of both Canadian and American households, accounting for socio-demographic differences and spatial characteristics where possible.

Data was collected over a 24 week period, with survey and focus group pretesting beginning in January of 2022. Requests for participation were distributed using several online mediums, with participants filling out the survey via Survey Monkey. Requests for participation were distributed using the inter-university listserv network, as well as Facebook, Reddit and Google Ads. Due to resource constraints, in person focus groups and interviews were conducted exclusively in the Greater Toronto Area.

In total, 1960 respondents participated in the study, but only 1632 successfully completed the full survey. Partial responses were disregarded and not included as part of the study sample. It should be noted that administering the survey exclusively online resulted in respondents under the age of 30 being over represented in the overall sample. While the average age of participants was 34.5, the median age was 28.6, with more than 1000 of the respondents indicating that they were under the age of 30. 59% of respondents were female, and 70.1% of all participants indicated some form of college education.
Survey participants broken down by geographic region are described below: US East: 28.2%
US West: 24.7%
US Central: 18.9% US South: 12.6% Canada: 15.6%

As a means to provide additional context to the survey results, several focus group sessions were conducted in parallel to the distribution of the online survey. As noted above, resource and time constraints only allowed for focus group sessions to take place in Southern Ontario. 4 geographical regions were targeted to conduct focus groups sessions. Geographic regions were defined by population density, geographic location and access to municipal waste management services. These groups included:

- Large Urban (Toronto, Brampton, Mississauga, York Region)
- Urban Regional (Ajax)
- Medium Urban (Waterloo)
- Rural Regional (Peterborough)

These groups were selected on the basis that they provide an adequate geographic representation of Ontario. A total of 9 focus groups were conducted over a 10 week period beginning in March

2022 and running through May 2022. Focus groups questions were organized into five main areas: (1) Attitudes toward packaging and packaging waste; (2) attitudes towards packaging design and self-reported purchasing behavior (3) perception of environmental risk based on improper disposal of packaging waste 4) perception of environmental harm based on packaging type/design; (4) perception of environmental harm based on end of life outcome and past recycling experiences and (5) Demographic information related to age, ethnicity, education and income.

This report is structured as follows:

1) Household attitudes towards packaging and packaging waste
2) Concerns expressed by households surrounding how waste is managed at end of life
3) Perception of environmental impact based on packaging design
4) Issues with terminology and how success is measured, quantified and communicated
5) Influence of terminology and phrasing on perception of environmental impact
6) Household attitudes towards package labeling and environmental certifications
7) Roles and responsibilities for educating households about packaging waste and what should be done with it
8) Ethnic variation in environmental attitudes and behaviors

2.0 Household Attitudes and Concerns Towards Packaging Waste

To establish a baseline of existing household attitudes towards packaging waste and its impact on the environment, study participants were asked a series of questions related to self-reported levels of concern for packaging waste and its impact on the environment, as well as individual contributions to the packaging waste problem. These results are summarized in figures 1 and 2 below.

Fig 1: Individual attitudes towards packaging waste

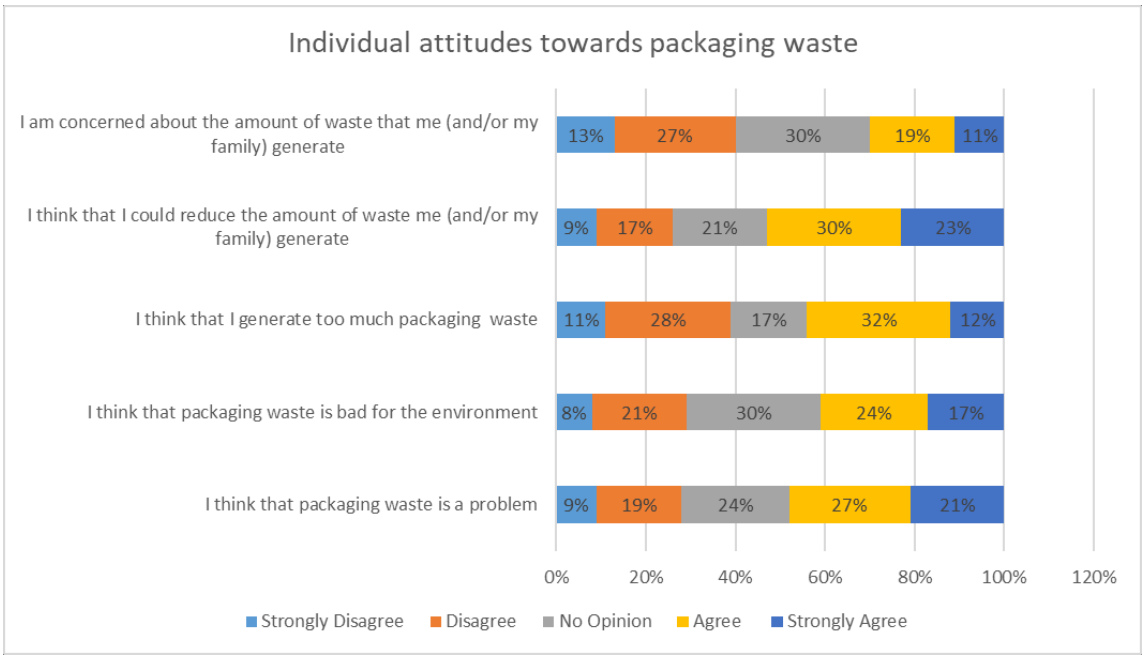
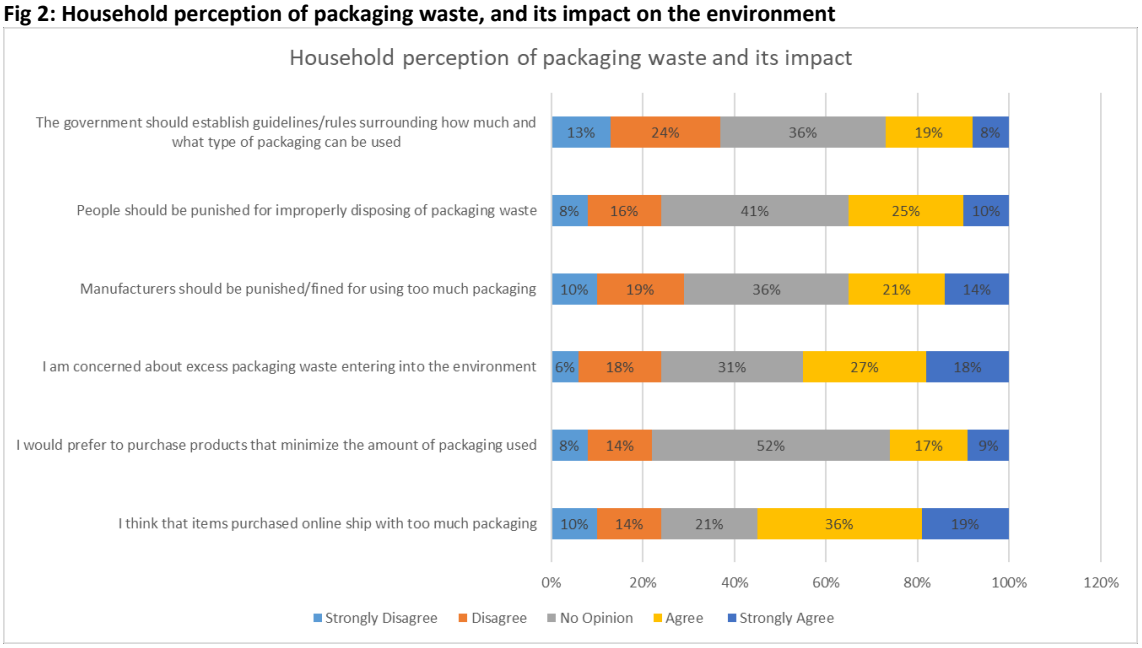


Fig 2: Household perception of packaging waste, and its impact on the environment

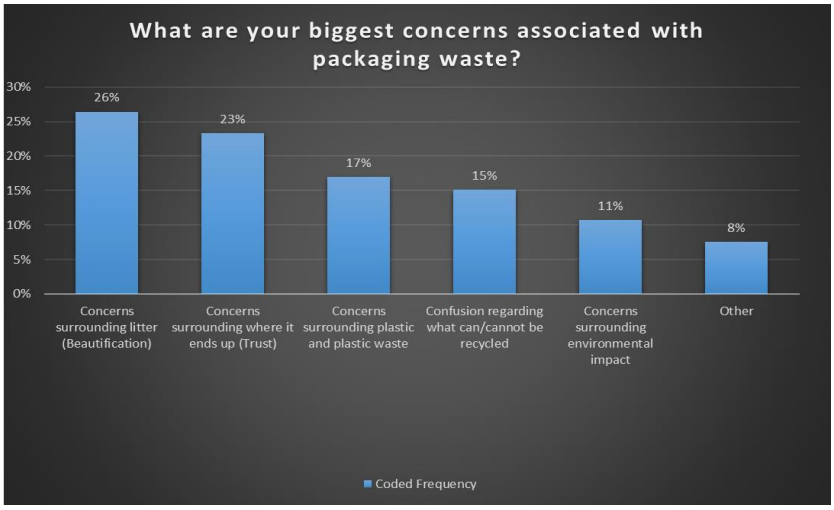


41% of total respondents agreed, or strongly agreed, with the statement "Packaging waste is bad for the environment", with 53% of respondents indicating that they were concerned about the quantities of packaging waste generated by their households. Based on the results gleaned from the surveys, almost half of all respondents viewed packaging waste, and excess packaging waste in particular, as being bad for the environment, with 55% of respondents indicating that products are shipped with unnecessary/excess packaging. 35% of respondents felt that both people and manufacturers should face some sort of punishment/penalty for either creating products that generate unnecessary packaging waste, or improperly disposing of packaging waste. Despite these concerns expressed by households, only 27% of respondents felt that the government should establish guidelines/rules surrounding what types and quantities of packaging should be used, and only 26% respondents said that they would prefer to purchase products that minimize the amount of packaging used.

2.1 Primary areas of concern for households regarding packaging waste

One of the primary objectives of this study was to identify which issues were of greatest concern to households regarding packaging waste and how it is managed at its end of life. Figure 3 illustrates the most frequently coded concerns expressed by study participants.

Figure 3: What are your biggest concerns associated with packaging and packaging waste?



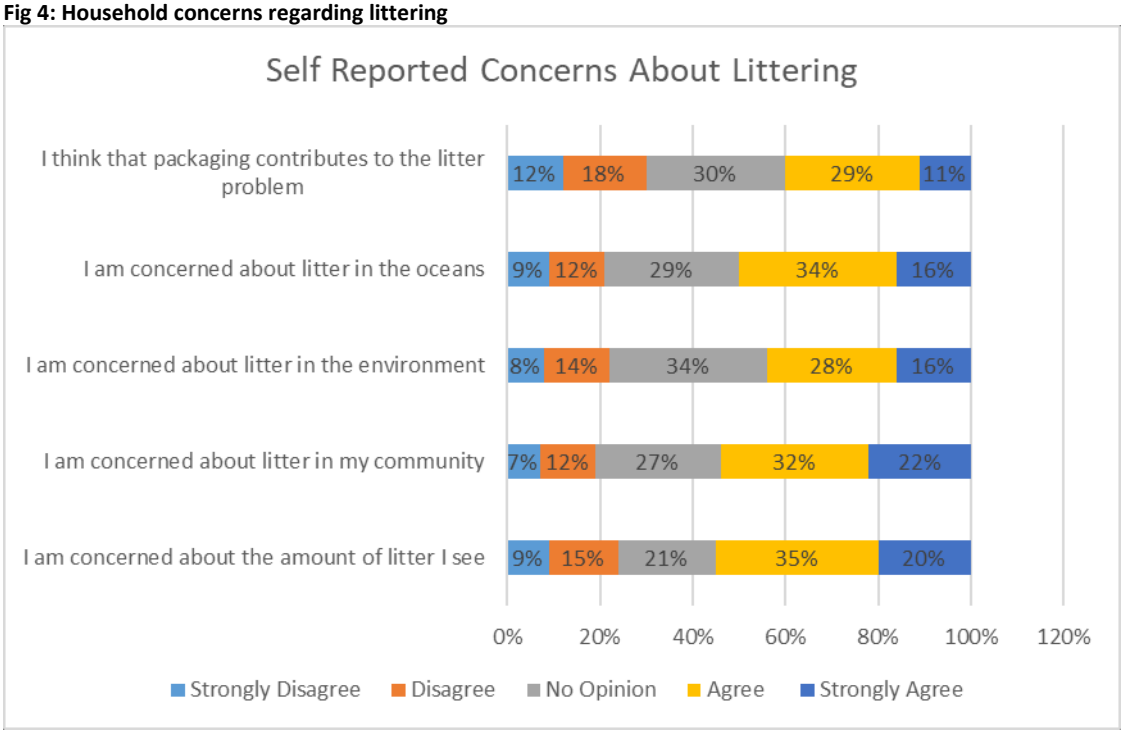
Concerns surrounding litter, trust and end of life outcomes, and the impacts of plastic and plastic waste were identified as the primary concerns expressed by households participating in the study. These results are discussed in greater detail below

2.2 Concerns surrounding litter/beautification and litter in the environment

Litter was one of the most commonly listed concerns expressed by survey respondents, with almost one fifth of all respondents indicating that litter was their primary concern with respect to packaging waste.

As shown in Fig 4, respondents felt that packaging contributed to the litter problem, with litter being a particular concern if found in oceans and in the general environment. Of note, the majority of respondents also indicated that they were not only concerned about the amount of litter they see, but the amount of litter within their respective communities. More than 65% of respondents felt that their city was not doing enough to address issues related to litter, and approximately half of respondents felt that littering fines should be increased and more enforced.

Fig 4: Household concerns regarding littering



2.3 Concerns surrounding plastics and plastic waste

As shown in figure 5, household attitudes towards plastic and plastic waste were largely negative, with households expressing significant concerns surrounding both the environmental and health impacts of plastic waste. While earlier survey work conducted in 2020 suggested that attitudes towards plastic packaging and plastic products improved during the height of the COVID pandemic, this change was not sustained over time (concerns surrounding plastics in our environment, and support for single use plastics bans had dropped by more than 50% during the height of the COVID pandemic in the Spring of 2020. 72% of respondents agreed that plastic packaging is bad for the environment, while 42% of respondents suggested that plastic packaging should be avoided when possible. However, households do seem to recognize that plastic packaging has an essential role to play in their day to day lives, with 83% of respondents indicating that some plastic packaging is okay.

Fig 5. Household attitudes towards plastic and plastic packaging

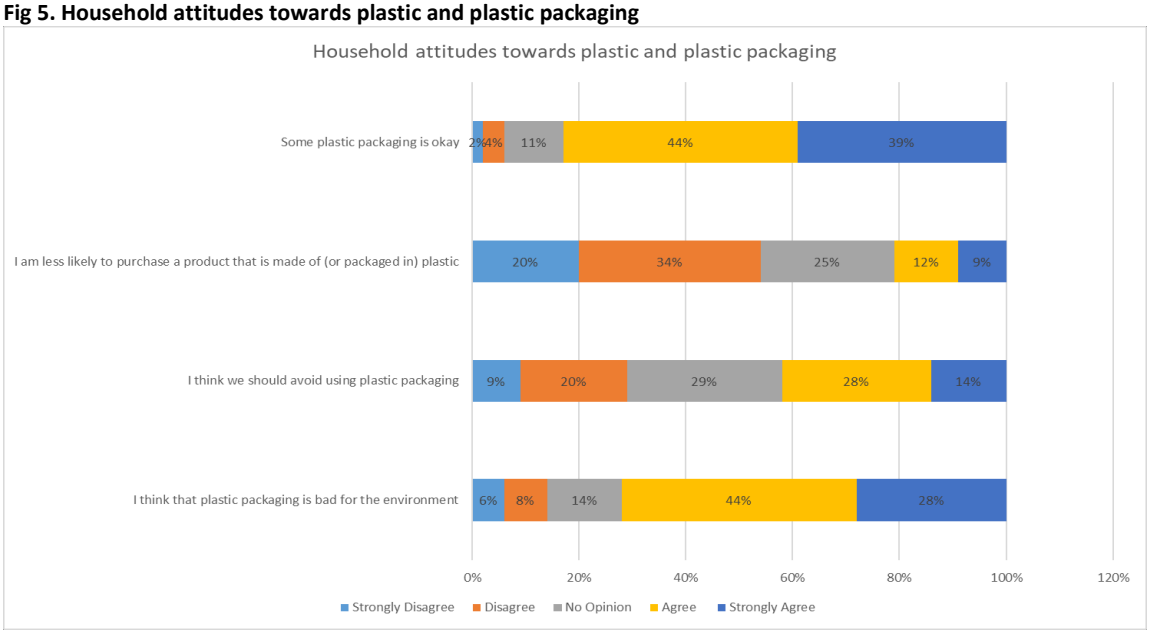
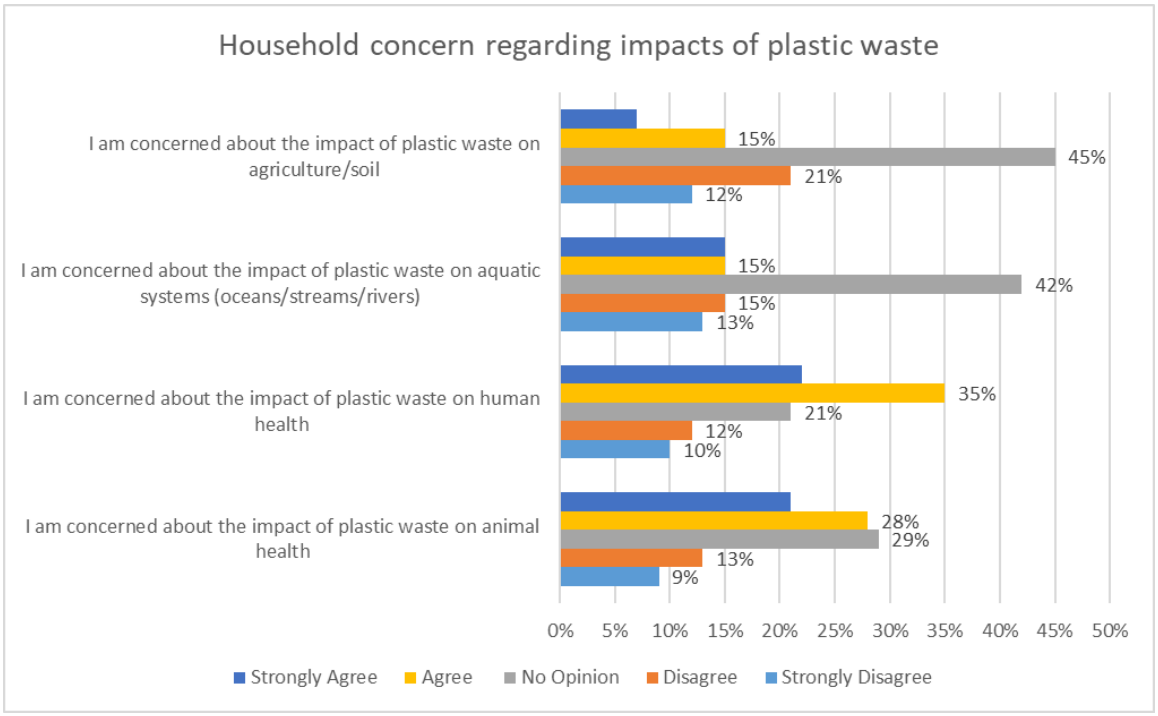


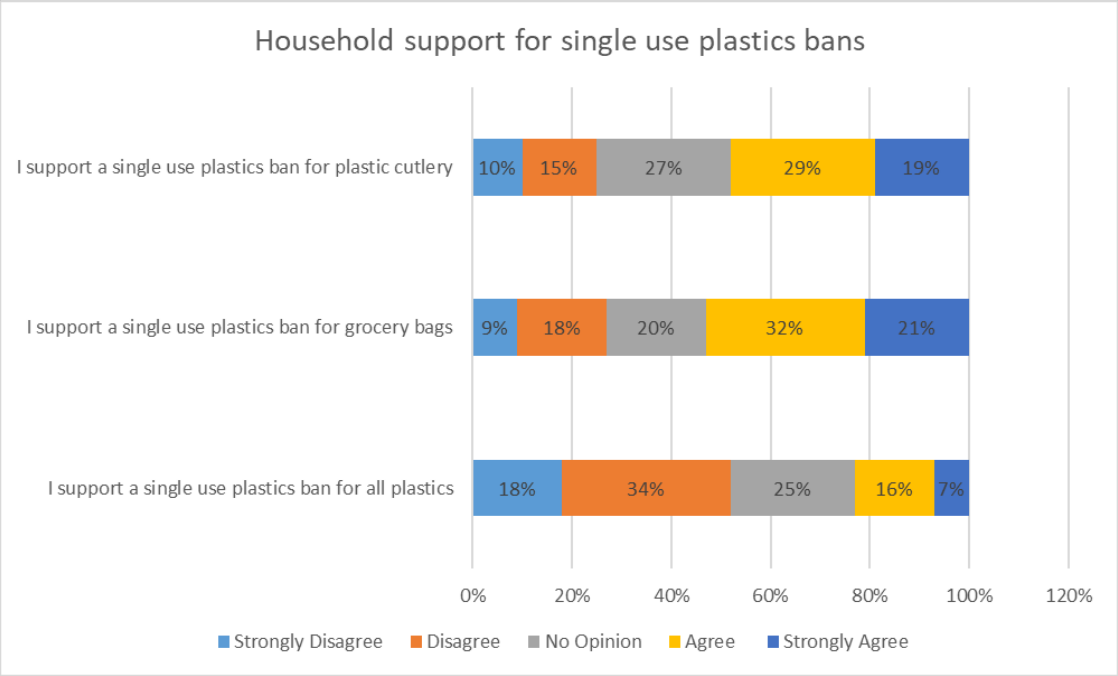
Fig 6. Household attitudes towards the impacts of plastic and plastic packaging



Households seem most concerned about the potential impacts of plastic on human and animal health, and to a lesser degree, impact on marine life and water quality. Respondents did not seem to readily associate soil and agricultural degradation as being a byproduct of plastics and plastic waste.

As shown in figure 7, support for single use plastic bans is mixed. While households seem to recognize that certain products (i.e. plastic grocery bags and cutlery) should be avoided and can be addressed via a single use plastics ban, only 23% responded favorably to banning all single use plastics. This compares to a 2016 study conducted by York University, in which more than 52% of respondents indicated their support for a single use plastics ban on all plastics. A potential explanation for this decrease in support for single use plastics bans is that the pandemic highlighted the role of plastics with respect to PPE and food contact safety.

Fig 7. Household support for single use plastics bans



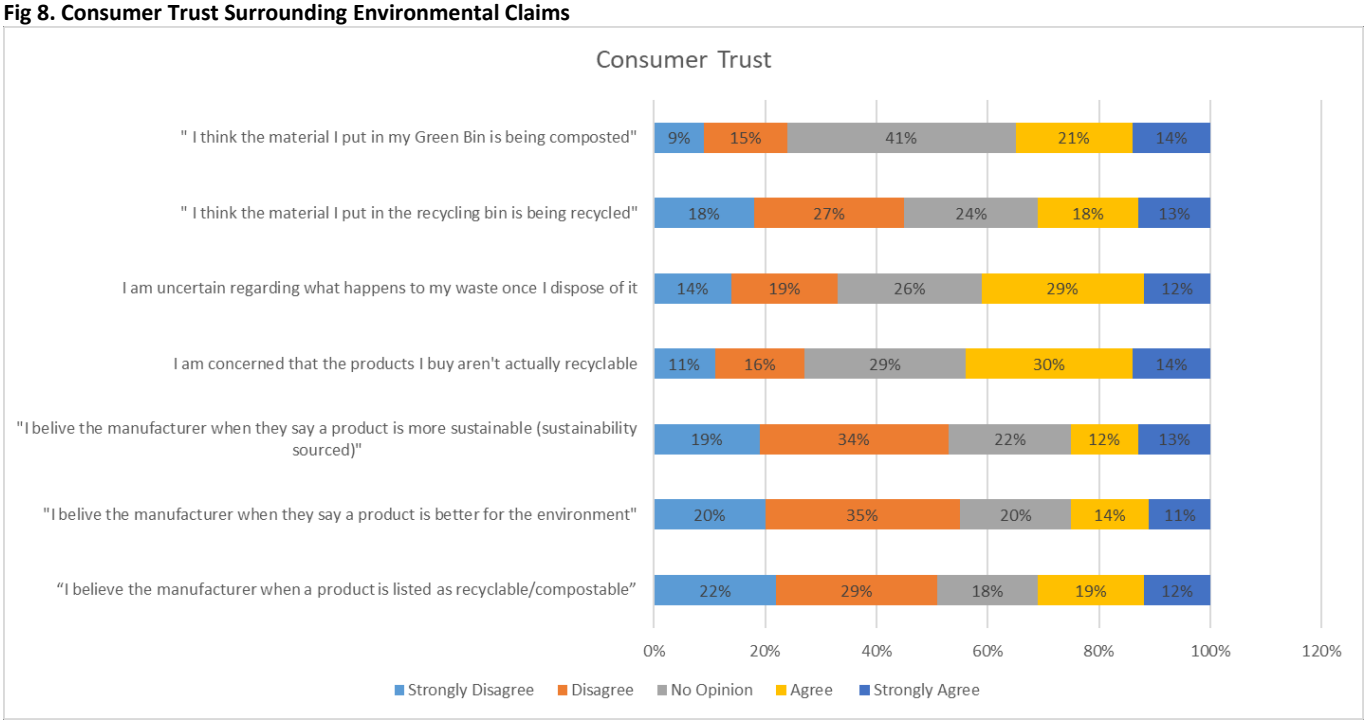
2.4 Concerns surrounding trust and end-of-life outcomes of packaging waste

A lack of trust on the part of consumers was a major theme identified in both the surveys and focus group sessions. This manifested in three possible ways:

- Lack of trust regarding what was happening to waste generated by households
- Lack of trust regarding sustainability/recycling claims made by manufacturers, and
- Lack of trust regarding the overall impact/importance of recycling, composting etc.

Figures 8 below summarizes consumer attitudes regarding both environmental claims made by packaging producers/municipalities, as well as what happens to waste at its end of life.

Fig 8. Consumer Trust Surrounding Environmental Claims



A significant percentage of respondents did not believe that the municipality (or service provider) was telling the truth with respect to what they say is happening to their waste. While the survey examined specific waste streams, commonly occurring concerns that were coded during the open ended questions include: "We aren't really recycling" "It all goes to the landfill" "It is getting shipped off to the 3rd world". More than 40% of respondents indicated that they were uncertain with respect to what happens with their waste once they dispose of it, while almost 50% of respondents felt as though the items they put in their recycling bin were not being recycled. This finding in and of itself is not surprising – households have historically reported poor levels of awareness regarding what happens to waste after disposal. What has changed significantly is that more than 44% of respondents agreed, or strongly agreed with the statement "I am concerned that the products I buy cannot be recycled". By comparison, only 21% of respondents in the university's 2016 study reported caring about what happens to their waste.

While it is difficult to specifically isolate what is driving these concerns and the general lack of trust, it appears that incidents that are highly visible and garner a lot of media attention generate considerable uncertainty and skepticism among the public. These incidents often become the focal point for public ire and undermine trust between waste service providers and the public. Further compounding this problem is that how waste is managed (and by whom) varies radically across jurisdictions, making it difficult to address/dispute by any one waste service provider (municipal or private).

A lack of trust was also exhibited with respect to recycling/environmental claims made by companies. 55% of respondents disagreed, or strongly disagreed with the statement "I believe the manufacturer when they say a product is good for the environment". Less than 45% of respondents believed that the environmental/recyclability claims made by companies are true– This includes claims surrounding recyclability/divertability of products, carbon impact and sustainable sourcing.

Once again, news/reports that question or find fraudulent environmental claims made by manufacturers resulted in increased doubt/skepticism among households – in many ways, we have a situation of "One bad apple spoils the bunch". When one manufacturer is caught making dubious claims, other manufacturers are punished for it in the court of public opinion. Households seemingly have difficulty differentiating between different types of products in a certain

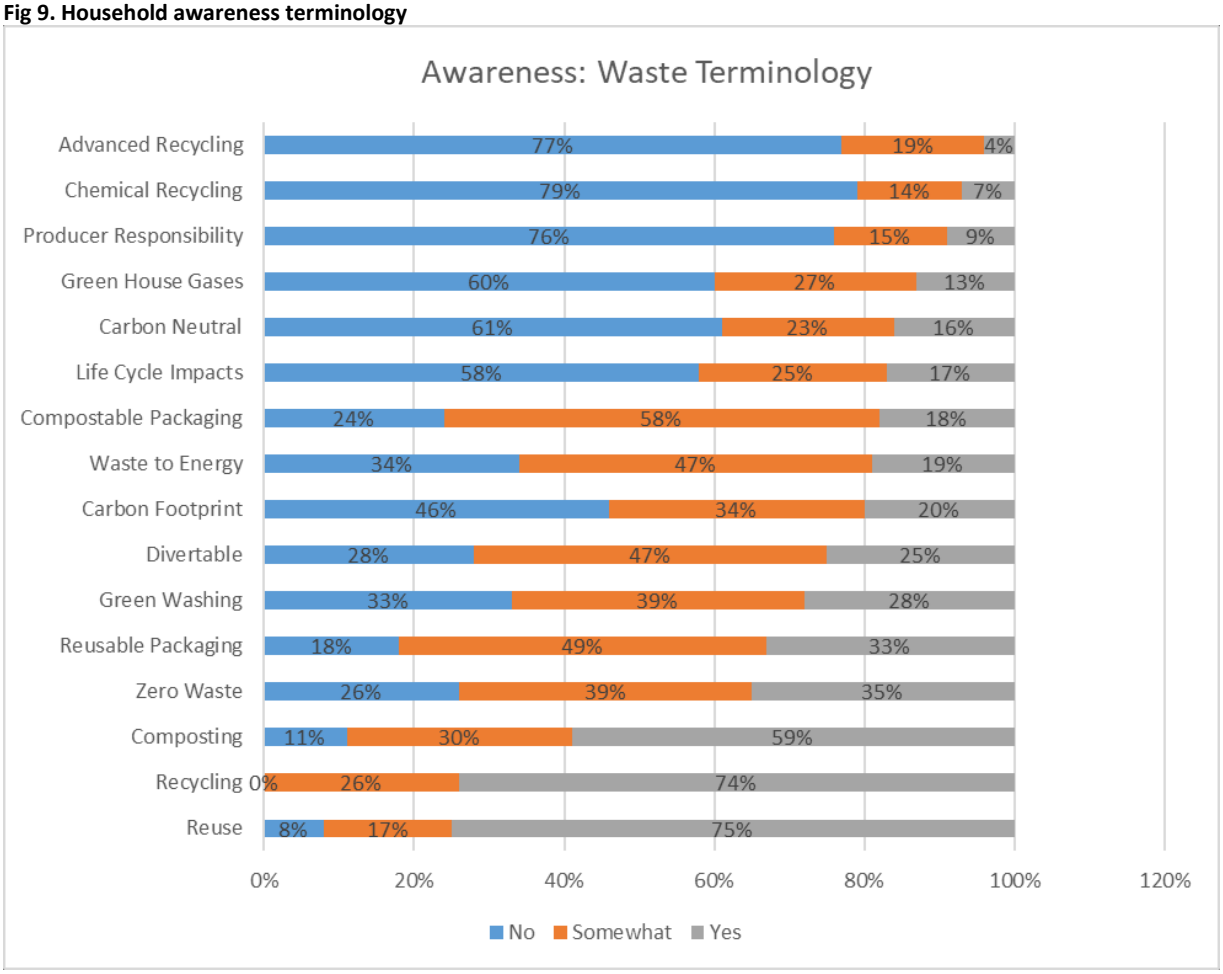
category, i.e. plastic vs. aluminum and compostable coffee pods. As an example, when Kuerig was sued for making false recyclability claims, all coffee pods (regardless of type) were stigmatized and assumed to end up in the trash.

There is a legitimate reputational risk to companies (and even municipalities), who make environmental claims that cannot be substantiated. More than 70% of respondents indicated that they would like to see false/deceptive environmental claims punished, while 42% of respondents indicated that they would be less likely to purchase from companies guilty of false/misleading environmental claims.

3.0 Issues in Waste terminology and how we communicate success

There are significant issues with terminology awareness, particularly surrounding carbon/GHG metrics, producer responsibility and alternatives to recycling, composting and reuse. These results are summarized in Figure 8 below:

Fig 9. Household awareness terminology



Out of the 16 terms/phrases tested, only three had comprehension/awareness scores exceeding 50% (recycling, composting and reuse). These results are particularly concerning, as many of these terms are used in environmental messaging to the public. What good is asking people to strive for a world with Zero Waste, when only 20% of people feel as though they knew what that means? For additional context, during focus group sessions, a large number of people struggled to distinguish between diversion and recycling, using the terms interchangeably. This was also true of reuse, which people often counted as a form of recycling.

Less than one quarter of respondents agreed (or strongly agreed) with the statement "I know what a circular economy is". This finding highlights that the way we communicate with the public regarding waste, including how we choose to define and communicate success, needs to be re- evaluated. A theme that emerged during the open-ended component of the surveys was that people lack context with respect to what certain metrics mean, i.e. "Is recycling 40% of waste good or bad?", "Is a carbon reduction of 1000 T/CO2e good or bad?" "Does zero waste really mean that we won't throw anything away?" etc.

Issues surrounding terminology and awareness also manifest in the way we communicate environmental impacts/performance (and how it is interpreted by the general public). As jurisdictions begin to consider mandatory environmental labeling on packages, careful thought needs to be given to what we want to communicate to consumers, and in what form (environmental footprint, carbon impacts, recyclability etc.). Is there value in having a label that says "This product uses 40% less carbon than the leading alternative", or "This product is made up of 100% compostable materials"? Yes and no. That information may be relevant to some people, but consumers often lack a frame of reference when interpreting environmental metrics – is saving 2 tonnes of CO2e good or bad? Does 100% compostable mean that I can put it in backyard compost, or do I have to put it in the Green Bin?

Of note, these studies echoed the findings of previous research, which found that the public doesn't fully understand or appreciate the environmental impacts of waste management outcomes that are not recycling. Reuse/refurbish, waste reduction, waste minimization, composting and incineration were waste management strategies that were not associated with desirable environmental outcomes. In short, households understand and appreciate the role that recycling can play in promoting sustainability, but the same cannot be said of other strategies on the waste management hierarchy. Respondents did recognize that certain materials/products must be safely managed and kept out of the environment as a harm reduction strategy (health and contamination hazards from household hazardous waste). However, respondents did not consider harm reduction as a component of promoting environmental sustainability.

Cultivating awareness and communicating impacts must be done in a way that makes sense to the average person, and do so in a way where there is a readily apparent link between the information being communicated and its relationship to sustainability.

3.1 Terminology relative to recycling

Part of our research was to gauge which terms that households viewed as being favorable relative to recycling, as well as which terms were viewed as being environmentally preferable. These results are summarized below.

Using recycling as our baseline, respondents were asked to rank various terms as being viewed more favorably, or less favorably, when compared recycling. The terms chemical recycling, waste to energy, mechanical recycling and regenerative recycling were viewed as being less favorable to recycling. Of note, terms that referenced growth or advancement (i.e. next-gen recycling, advanced recycling) were viewed more favorably when compared to recycling alone. Generally speaking, respondents were not aware that there are different types of recycling, and as a result, using descriptors such as chemical recycling or mechanical recycling resulted in a less favorable perception of the activity.

A similar theme emerges when respondents were asked to evaluate the environmental benefits of various waste management outcomes relative to mechanical recycling. Almost universally, respondents indicated that recycling was the end-of-life activity that was best for the environment (both relative to other types of recycling, i.e. chemical recycling, as well as relative to other strategies on the waste management hierarchy (i.e. recycling is preferred to both waste reduction and reuse). This finding is consistent with previous research on this topic, wherein the public does

not readily associate reduction, reuse, composting or waste to energy with environmental impact or sustainability.

Fig 11. Household Recycling Favorability

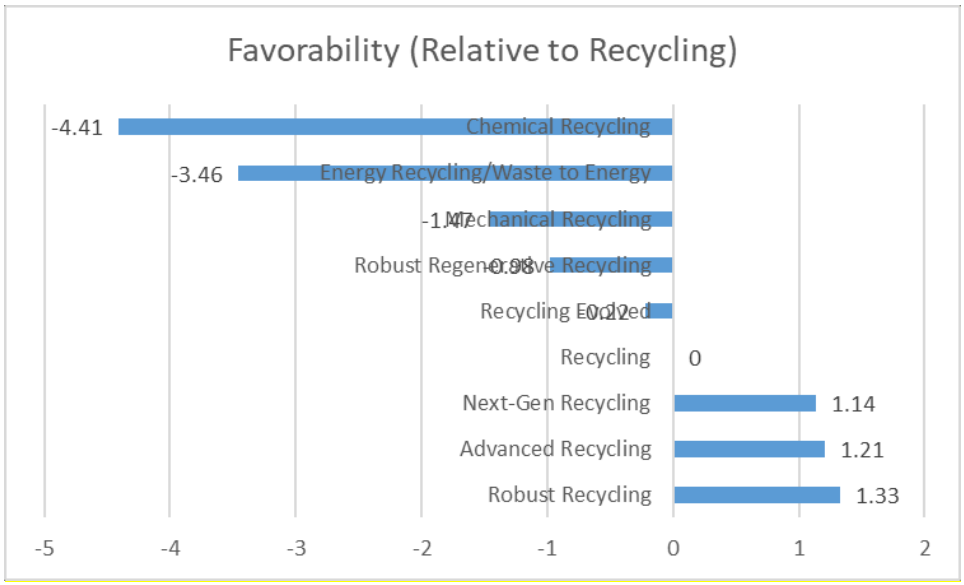
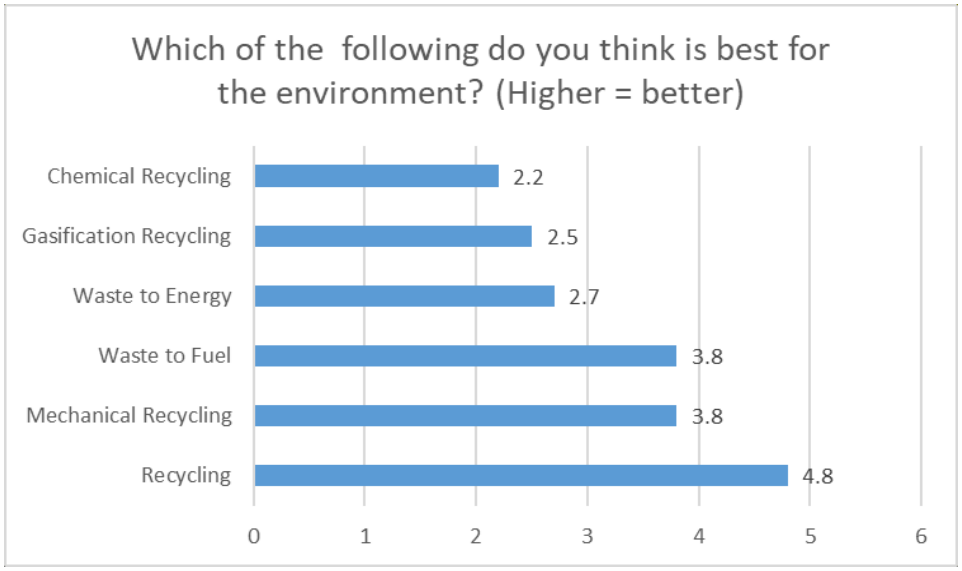


Fig 12. Perception of what is best for the environment



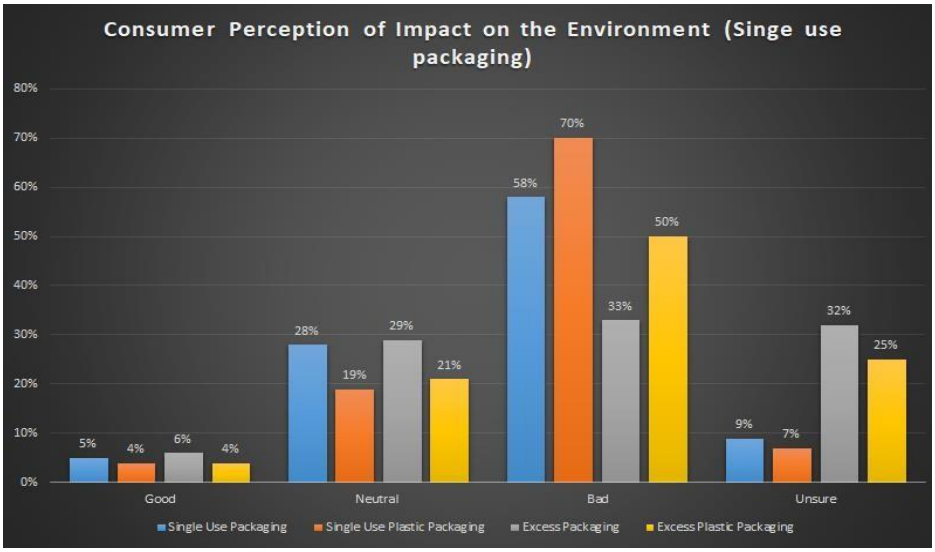
3.2 Influence of Terminology and Phrasing on Perceptions of Environmental Harm

Consumer perception of environmental impact is significantly influenced by both the words

/phrasing that we use and how we choose to describe a particular product or activity. This is particularly true of terms that reference plastics (or plastic packaging)

Figure 13 below shows how survey respondents perceive the environmental impact (good, neutral, bad, unsure) of single use packaging:

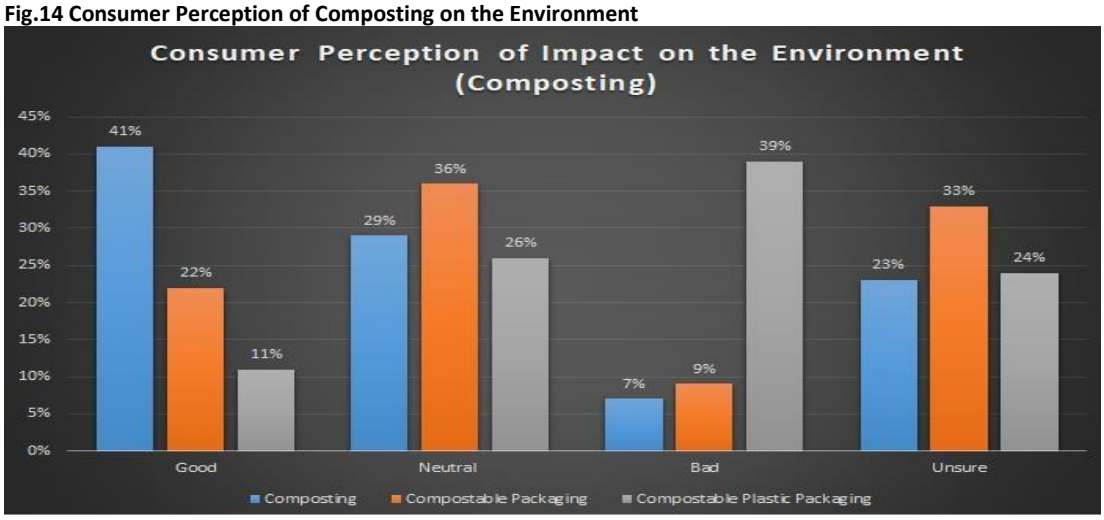
Fig 13 Consumer Perception of Single Use Packaging on the Environment



Generally speaking, households associate the terms single use and excess packaging as being "bad" for the environment. While this isn't a surprising outcome, what is worth noting is that adding the word "plastic" to single use and excess packaging resulted in a marked increase in perception of environmental harm. There was a 20.6% increase in respondents who indicated that single use plastic packaging was bad for the environment, when compared to single use packaging alone. This result was even more pronounced for excess packaging vs. excess plastic packaging, which saw a 50.5% increase in respondents who characterized excess plastic packaging as "bad".

A similar results was observed for compostable packaging (Shown in Figure 14) - where the addition of the word 4plastics resulting in a 557% increase in the number of respondents who indicated compostable plastics were bad for the environment (when compared to compostable packaging alone). Note: Compostable packaging was seen significantly less favorably when compared to the term composting alone.

Fig.14 Consumer Perception of Composting on the Environment



While the exact cause of this change in consumer perception cannot specifically be isolated, it would appear that consumers have been inundated with negative messaging surrounding plastics, and plastic packaging in particular. This ultimately manifests itself as a negative association with the term plastics, irrespective of whether it has any impact on the environment (positive or negative).

Changes in consumer perception based on wording is not exclusive to plastic products - changes in phrasing or order of terms can also significantly impacts how consumers perceive environmental impacts of packaged products (Even if the underlying definition has not changed). Figures 15 and 16 illustrate this finding:

Fig. 15 Consumer Perception of Recycling on the Environment

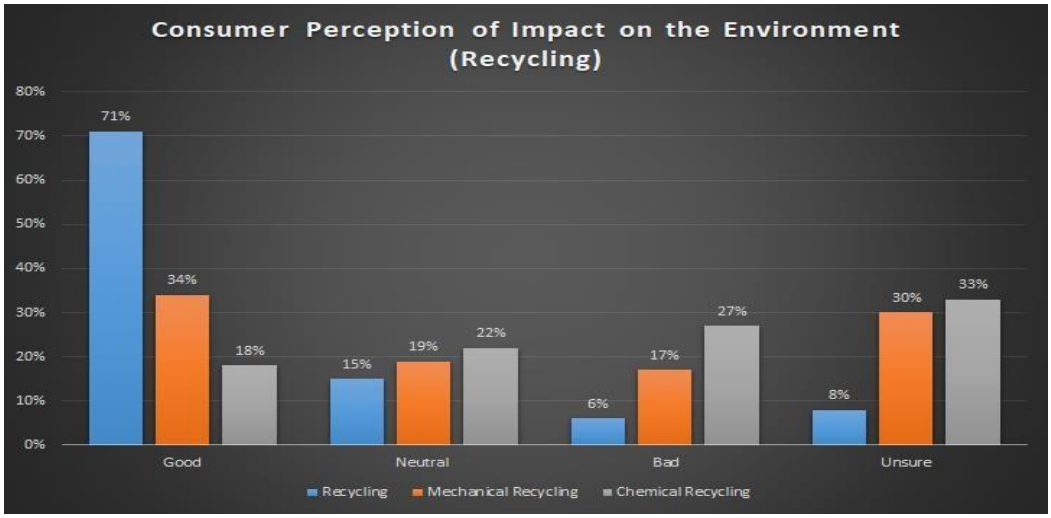
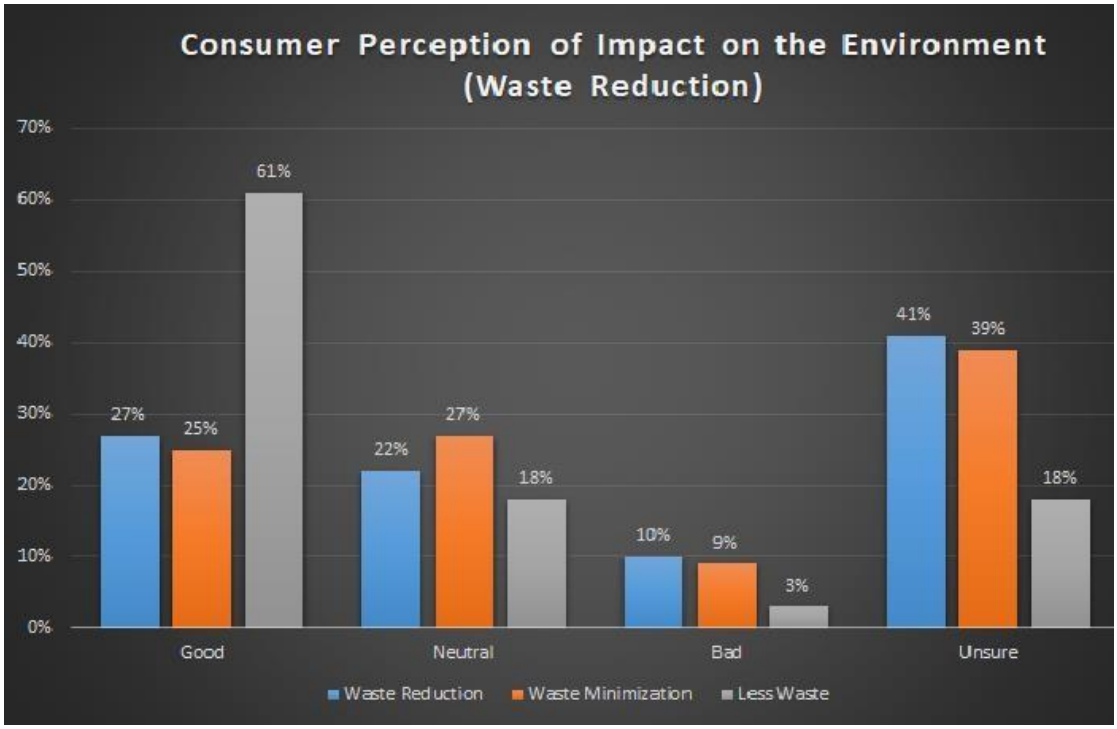


Fig.16 Consumer Perception of Waste Reduction on the Environment



The use of the term mechanical or chemical recycling results in a significant decrease in perceived environmental impact when compared to the term recycling alone. A similar result was observed for waste reduction, which saw the term "Less Waste" being viewed more favorably among households when compared to reduction or minimization. It should be noted that our study could not establish a causal relationship between why certain phrases resonated with respondents more than others. However, we hypothesize that while all of these terms are interchangeable to a degree (with the exception of chemical recycling), households seem to have a very limited definition of what constitutes recycling and reduction. As a result, anything that falls outside that purview is met with skepticism with respect to the environmental impacts at end of life.

While additional research needs to be conducted in this area, our findings suggest that words matter. It is critical that producers, municipalities and service providers communicate in a clear and consistent way, and better educate consumers about what terms mean and why.

3.3 Key Considerations in Communication

Issues surrounding terminology and awareness also manifest in the way we communicate environmental impacts/performance (and how it is interpreted by the general public). As jurisdictions begin to consider mandatory environmental labeling on packages, careful thought needs to be given to what we want communicate to consumers, and in what form (environmental footprint, carbon impacts, recyclability etc.). Is there value in having a label that says “This product uses 40% less carbon than the leading alternative”, or “This product is made up of 100% compostable materials”? Yes and no. That information may be relevant to some people, but

Consumers often lack a frame of reference when interpreting environmental metrics – is saving 2 tonnes of CO2e good or bad? Does 100% compostable mean that I can put it in backyard compost, or do I have to put it in the Green Bin?

While there is an increasing trend by both producers and government to define environmental goals in terms of carbon reduction/abatement, carbon quantification IS NOT enough – most people, including producers and consumers, have little context for what carbon reduction means in real terms. Key performance indicators need to be relatable, easy to conceptualize, easy to understand, and expressed in a way that allows for comparison (comparing between two products, or comparing between two time periods).

Cultivating awareness and communicating impacts must be done in a way that makes sense to the average person, and do so in a way where there is a readily apparent link between the information being communicated and its relationship to sustainability. Based on our research to date, the following are some considerations regarding communicating environmental impacts

Who are we trying to communicate with? How we choose to communicate environmental impacts is very much contingent on who the intended audience is. While our discussion has largely revolved around consumers, the terminology, metrics and key performance indicators we use are a function of who our intended audience is (policy makers, industry, academia, NGOs etc.)

What is it are we trying to communicate? Is the purpose to provide information regarding what to do with a product at its end of life (recycling, composting etc.)? Is it quantify environmental footprints of products and activities and convey that information to people, or are we providing more general guidance surrounding the relative sustainability of a product/activity? (akin to the environmental score card for packaging or are we providing relative guidance to help inform purchasing decisions? (Product A is "Greener" than Product B).

Where do we choose to communicate? Communicating environmental impacts at the point of sale, or on product packaging has gained significant traction in recent years. However, is this the most effective medium for doing so? Are consumers looking for this type of information to help inform purchasing decisions? What other resources could be used to communicate environmental impacts in a way that is accessible to consumers?

Why are we trying to communicate? How is the information we are communicating being used, and to what end? Is the purpose to increase awareness regarding the environmental impacts of what we consume? Is it to help both consumers and policy makers make more informed decisions? Answering the question of "Why" is more difficult than it seems, as the motivation behind communicating environmental impacts (and who the intended audience is) differs based on what our broader goals and objectives are.

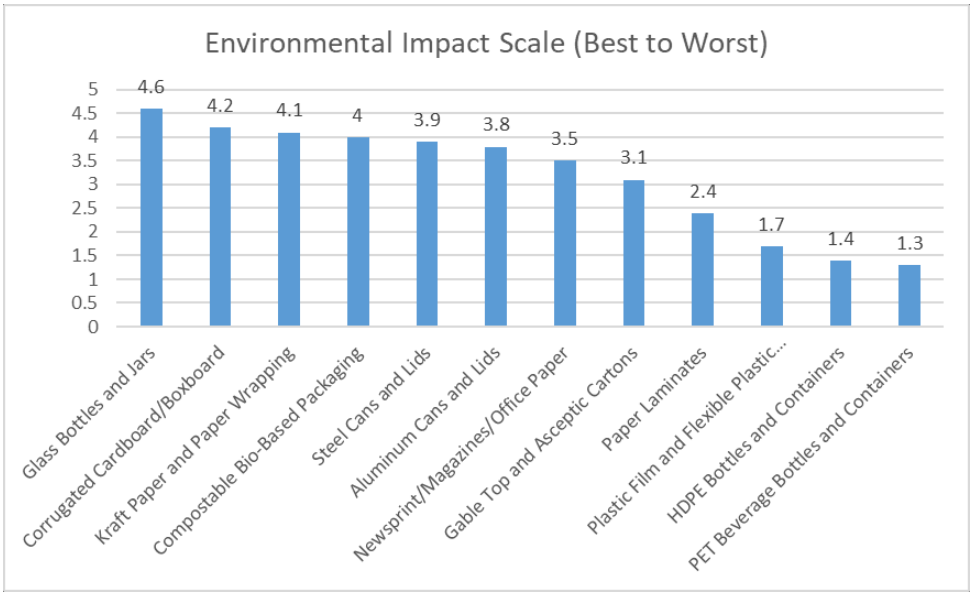
Ultimately, effective communication must first start by identifying what data is needed, how this data will be collected, and how best to tell a product/packages "sustainability story". Stakeholders need to be equipped with the right data, and the right "language" to ensure maximum engagement.

4.0 Perception of Environmental Harm by Material Type

Figure 17 below summarizes consumer perception of environmental impact by material category type. Higher scores indicate that respondents view a particular material type as being better for the environment, while lower scores indicate that respondents view a particular material type unfavorably.

Figure 17: Environmental Impact Scale for Various PP&P Materials

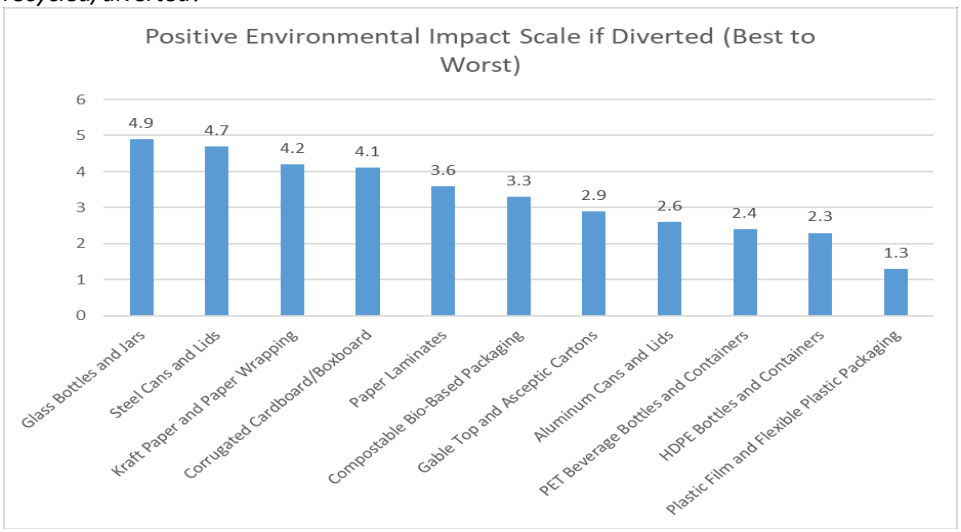
Survey Statement "Which of the following packaging types do you consider as being most harmful if they are not recycled and left in our environment?"



While additional research needs to be conducted in this area, our findings suggest that there are significant differences in how consumers view the environmental impact of various packaging types. Generally speaking, glass, paper and paper based products are viewed more favorably than plastics and multi-resin materials. Given that there is already an established relationship between perception of environmental harm and willingness to recycle (or divert), the aforementioned findings suggest that promotion and education campaigns should target messaging that addresses the most environmentally problematic materials.

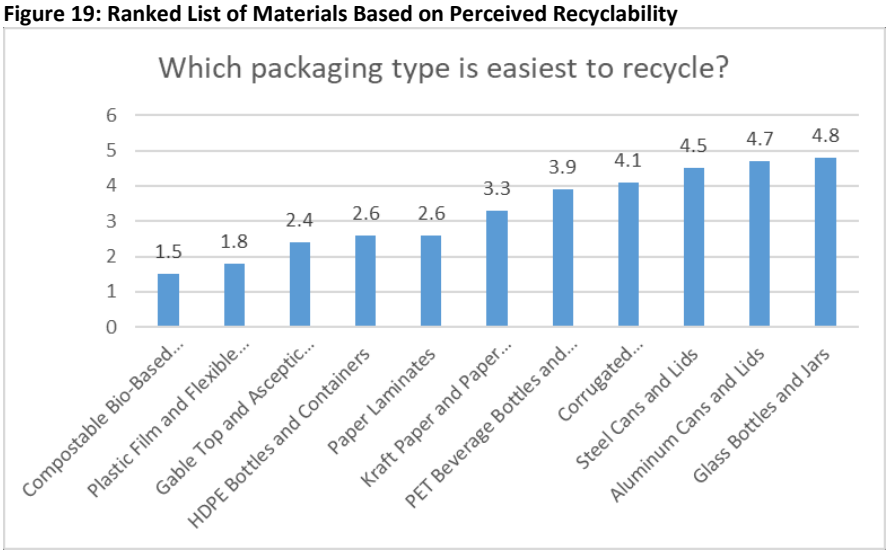
Figure 18: Perceived Environmental Benefit of PP&P When Diverted

Survey Statement: "Which of the following packaging types do you consider as being "best" for the environment when recycled/diverted?"



A key finding of this study is that perception of environmental harm is not necessarily mirrored by what respondents think is most recyclable/divertible. Figure 19 below summarizes the materials that respondents indicated were easiest to recycle (with a higher score indicating increased levels of recyclability).

Figure 19: Ranked List of Materials Based on Perceived Recyclability



5.0 Perception of environmental impact based on design for end of life

One of the objectives of this study was to better understand how the recyclability/compostability/reusability of packaging affects consumer purchasing habits and how consumers view the efficacy of various waste management options relative to one another (i.e. recycling vs composting, packaging reduction vs. reusability etc.)

To glean insights into this topic, survey respondents were asked about the following:

(1) Which end of life waste management activity is perceived as being "best for the environment"?

(2) The influence of packaging design and overall recyclability/reusability/compostability of a package on household purchasing decisions

(3) Household preferences for future packaging design

5.1 Which end of life waste management activity is perceived as "best for the environment"?

Respondents were asked to select which of the following end of scenarios was "best" for the environment. No formal definition of what constituted "best" was provided, as the term was deliberately left open for interpretation as a means to capture subjective responses. Respondents were also asked to rank various end of life waste management options from most beneficial to least beneficial. These results are summarized in figure 18 and table 1 below:

Figure 20: Which EOL activity is best for the environment?

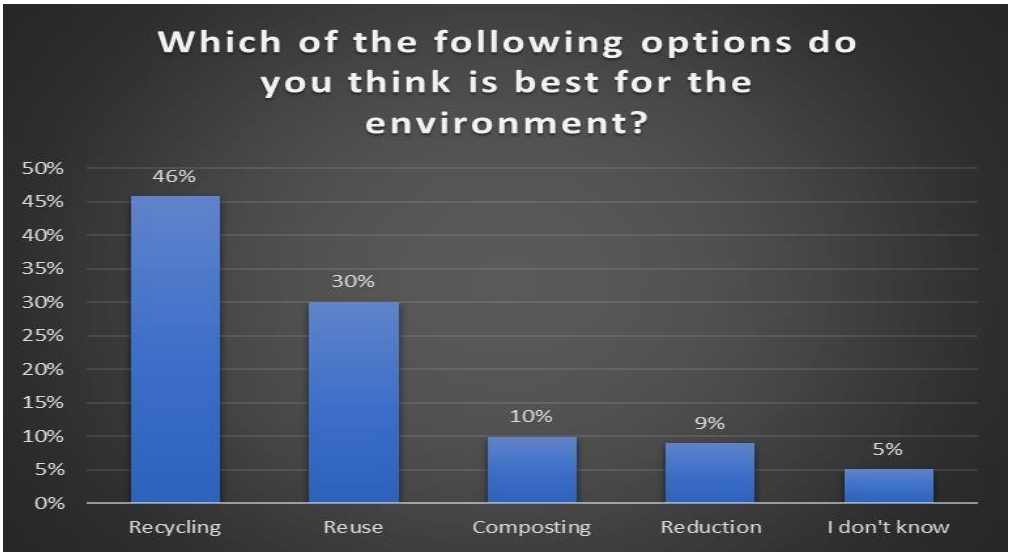


Table 1: Relative ranking of EOL waste management options from most beneficial to least beneficial

Survey Statement: From most beneficial to least beneficial, rank the following options based on what you think is best for the environment, i.e. Recycling is #1, Composting #2, Reduction #3, Reuse #4 etc.

	This package can be	This package can be	This package can be composted	This package uses less material
#1 (Most Important)	555	426	99	93
#2	423	495	138	117
#3	51	252	543	327
#4 (Least Important)	0	27	429	717

The results shown in Figure 20 and Table 1 point to a curious finding that contravenes what most waste management professionals would expect based on the waste management hierarchy. Instead of reduction being preferred to reuse, and reuse being preferred to recycling, household responses are inverted, with recycling consistently being selected as being "best for the environment" among respondents. While this result goes against conventional wisdom, it is also not entirely unexpected.

Recycling, particularly for printed paper and packaging, has been a key policy focus in both Canada and the United States – it is often the easiest and most accessible way for households to participate in environmental initiatives that are intended to promote habitual behavior. For the better part of three decades, households have been inundated with messaging intended to encourage recycling, which has ultimately manifested in people thinking recycling should be prioritized relative to other waste management strategies.

The results shown above also indicate a preference for re-use – it appears that it is conceptually easy for households to understand that reusing a material prevents (or delays) the need to produce more packaging, while simultaneously helping avoid sending materials to disposal.

By comparison, composting and packaging reduction were shown to have the lowest perceived environmental benefit. Composting has only recently entered the mainstream lexicon with respect to packaged goods, and as a result, households have yet to see the potential environmental benefits that can be offered by making the switch to compostable packaging alternatives. For many, composting is something that people do in their backyard with scrap organic waste, and not necessarily associated with packaging materials that can substitute for plastics.

Packaging/waste reduction was seen as being the least preferred end of life option for PP&P, which is fundamentally at odds with the waste management hierarchy. One of the issues in getting households to understand the impact that waste reduction can have on the environment is that quantifying reduction can be extremely difficult. Given that conventional key performance indicators (such as recycling rates, waste per capita etc.) are weight-based metrics, packaging reduction can obscure program performance (i.e. more items are being recycled, but since packaging now weighs less, recycling rates are declining).

5.2 The influence of EOL waste management outcomes on consumer purchasing decisions

Generally speaking, previous research examining the influence of "green" attributes on consumer purchasing decisions has shown that people are willing to pay a premium for products they perceive to be "good for the environment". Most households say that they regularly recycle, and that the recyclability of a package informs their purchasing decisions. In a previous study conducted by York University in 2020, more than 60% of respondents indicated that they were willing to pay a premium for environmentally friendly products, and expressed high stated levels of concern for recycling, sustainability and the environment as a whole. These results were echoed in a survey of 30,000 people conducted by Accenture. Their study found that the majority of households prefer to purchase products from companies that shared their social and environmental values. However, it is important to note two things:

- Self-reported behaviors tend to overstate an individual's participation in activity/behavior that is seen as being socially beneficial. In this case, a willingness to purchase products that are seen as being "good for the environment". The disconnect between stated action and observed behavior is known as the value action gap. An individual's stated preferences will diverge from observed behavior, particularly in instances where the activity/behavior is seen to be socially/environmentally conscionable, or can be used as a proxy measure for socio-economic attributes (wealth, education etc.).
- There has been a notable shift in self-reported willingness to purchase environmentally friendly products over the past two years.

Figure 21 through 23 below summarize survey responses along three thematic areas:

1) If a person was more likely to purchase a product that could be recycled/composted/diverted
2) If a person was willing to pay more for products that could be recycled/composted/diverted
3) If a person thinks about the environmental impact of products before making a purchase

Fig 21. Purchasing Preferences in response to the products that can be recycled/composted/reused/diverted

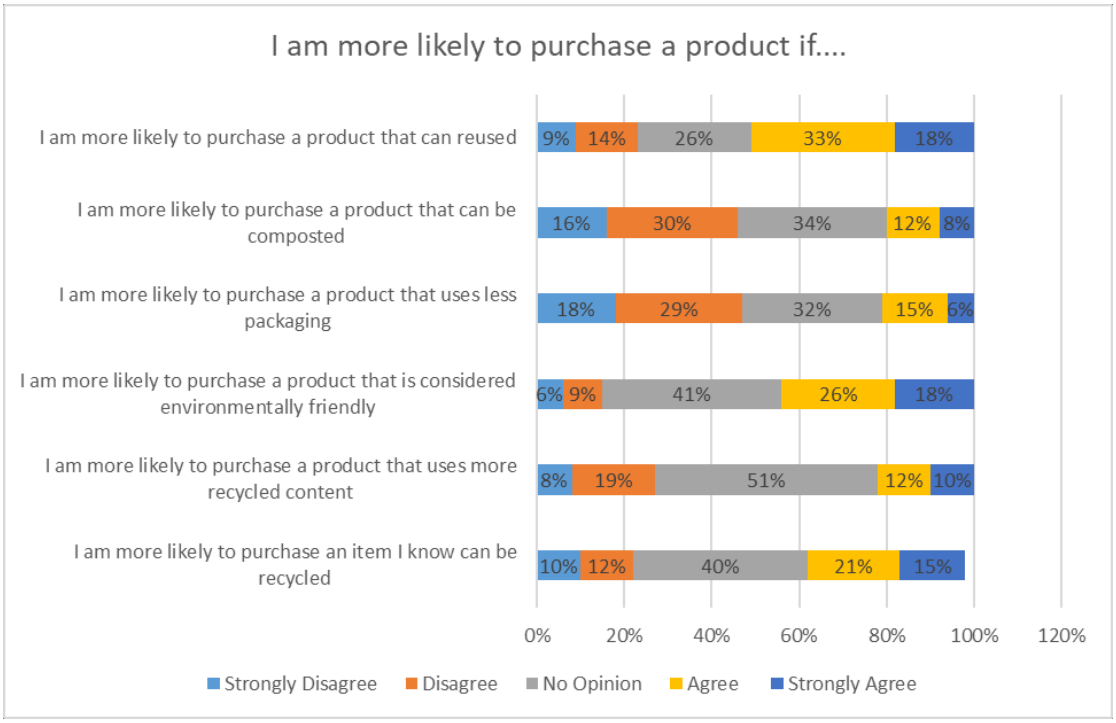


Fig 22. Willingness to pay an Environmental Premium for "Green" Products

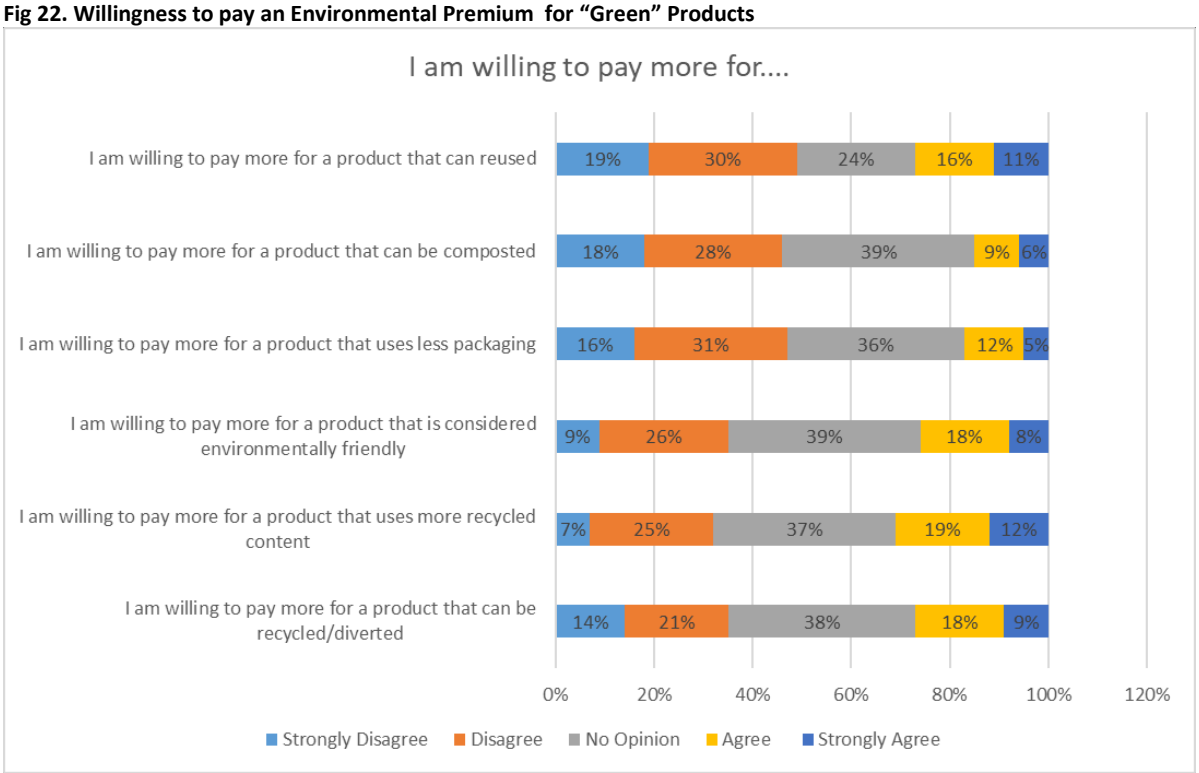
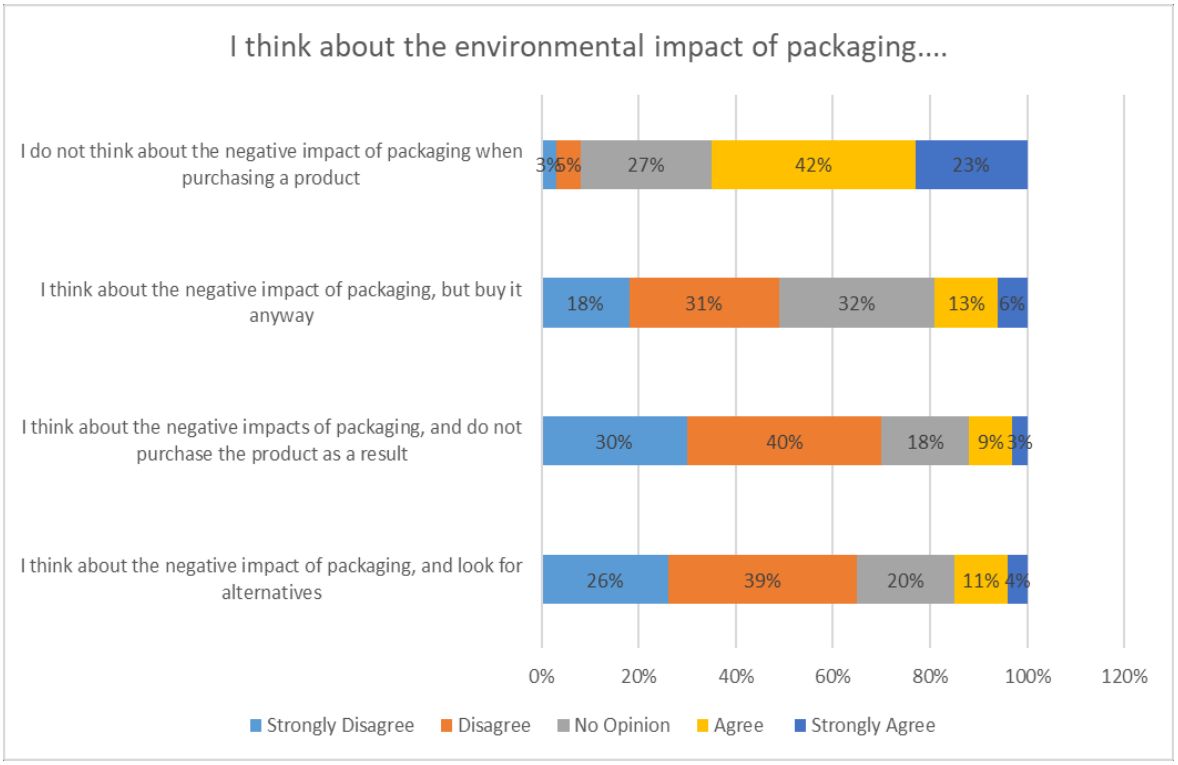


Fig 23. Consumer consideration of environmental impacts of packaging

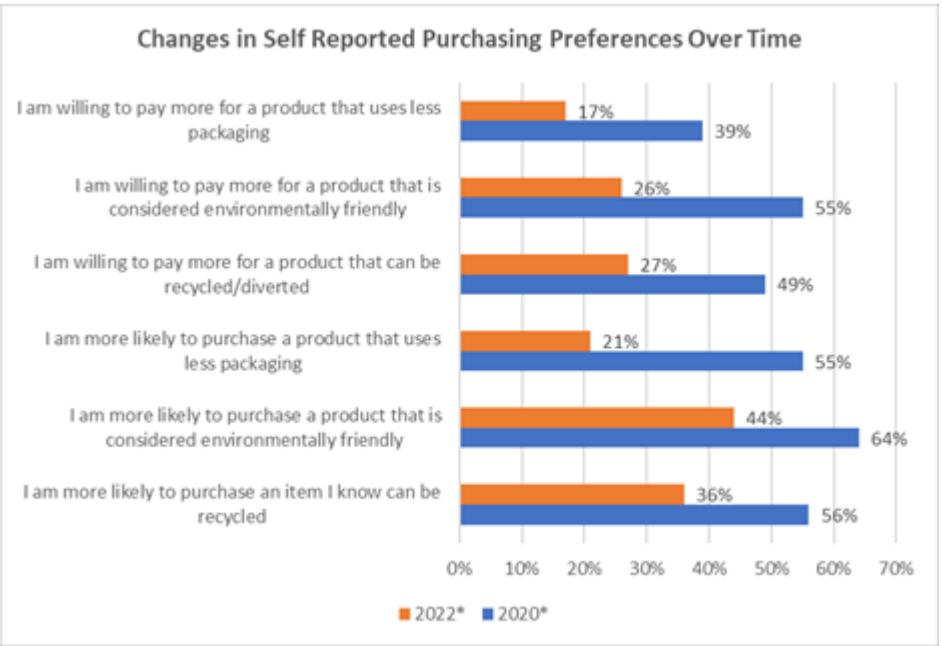


As shown in figure 24, 36% of respondents indicated that they would be more likely to purchase a product that can be recycled, 22% of respondents indicated that they would purchase a product that contained recycled content, 21% of respondents indicated that they would be more likely to purchase a product that minimizes packaging waste, and 51% of respondents said they would be more likely to purchase a product that can be reused

What is particularly interesting about these findings is that it represents a significant decrease in self-reported preferences for both purchasing and paying a premium for a product that can be recycled/diverted. When compared to a previous study conducted by York University in 2020, self-reported measures of willingness to purchase environmentally friendly products, and willingness to pay a premium for said products, decreased by more than 50% in some instances.

Figure 24 below provides several examples of how self-reported behaviors and preferences have changed between 2020 and 2022.

Figure 24: Changes in self-reported purchasing behavior over time



While an exact cause for this shift in self-reported behaviors cannot be identified, anecdotal evidence gathered during interview sessions is that inflationary pressures are forcing households to make purchasing decisions that are more centered around price, ease of access and affordability. The issue of affordability has become such a focal point for consumers, that people may no longer feel pressured to overstate their willingness to purchase and use "green" products. Additional research needs to be conducted in this area to better understand the convergence of self-reported and observed behaviors.

Another salient finding from this study is that households are now much less likely to pay a premium for environmentally friendly products, and no longer consider recyclability/compostability/divertability as being a primary motivator when making purchasing decisions.

5.3 Consumer preferences for future packaging design

Given the rise in awareness regarding single use plastics and waste in general, this subset of questions was designed to gauge what consumers would like to see in available packaging options moving forward.

Survey statement: From a scale of 1-5, with 5 being "Strongly Agree" and 1 being ("Strongly Disagree"), please provide answers to the following survey statement(s)

a) I would like to see more packaging that can be made recyclable
b) I would like to see more packaging that can be made compostable
c) I would like to see more packaging that can be reused over time
d) I would like to see decreases in the amount of packaging used moving forward

These results are summarized in figure 25 and Table 2 below.

Figure 25: Consumer preferences for future packaging

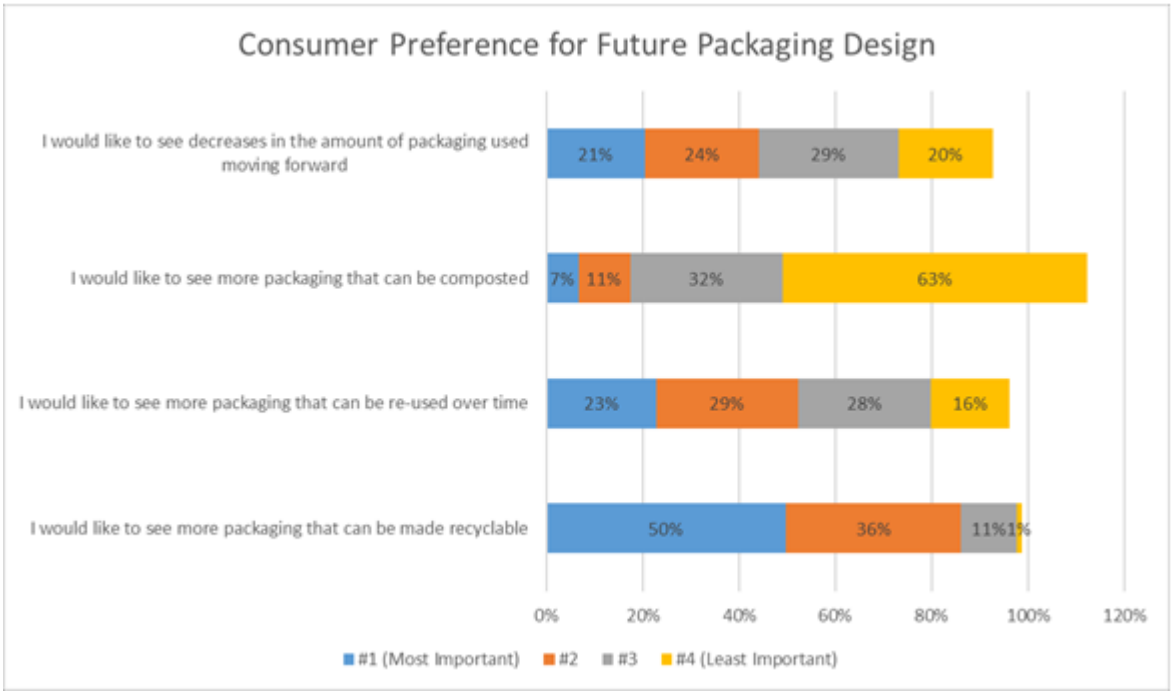


Table 2: Preferences for future packaging design (most important to least important)

From most important to least important, rank the following options based on what you would like to see happen to packaging materials moving forward, i.e. Composting is #1, Recycling #2, Reduction #3, Reuse #4 etc.

	I would like to see more packaging that can be made	I would like to see more packaging that can be re-used over	I would like to see more packaging that can be composted	I would like to see decreases in the amount of packaging
#1 (Most Important)	516	237	69	213
#2	375	303	111	243
#3	123	297	341	312
#4 (Least Important)	12	180	698	216

On aggregate, respondents indicated that they would like to see more divertible options for packaging - in every case, the majority of respondents indicated that they agreed, or strongly agreed, with the development of more recyclable (80%), compostable (71%), reusable (58%) and reduced (70%) packaging options.

This finding is consistent with our understanding of household attitudes towards sustainable waste management – people want to purchase products that can be managed responsibly at the end of life. However, as shown in Table 2 above, households place greater emphasis on recyclable options relative to other waste management scenarios. While the majority of respondents did not associate packaging reduction with environmental benefits (see section 1), they do still want to see less packaging in the future.

Given the proliferation of online shopping (where goods are nested in multiple forms of packaging to prevent damage during transit), households are facing a "packaging overload" and would like to see reduced packaging moving forward. However, decreased packaging is not seen as a significant driver of consumer purchasing decisions. People want less packaging, but less so than having a package that can be readily recycled.

6.0 Attitudes towards package labeling and environmental certification

One of the primary objectives of this study was to better understand the role of packaging labels and packaging certifications in affecting consumer purchasing decisions and attitudes towards how waste is managed at its end of life. Increasingly, jurisdictions across North America and Europe are looking towards standardized package labeling systems that clearly communicate a product/packages recyclability to consumers. This is done to help alleviate confusion surrounding packaging labels, as variations in recycling programs, unclear labeling, and inaccurate recyclability claims can discourage household recycling/diversion behavior. Results in Table X below summarize general attitudes towards package labeling, including the importance of labeling when making a purchasing decision and what information consumers want to see included on a package/product
label.

Table 3: Attitudes towards package labeling

Attitudes towards package labeling	
How important is package labeling to you?	Score
Very Important	19%
Somewhat Important	30%
Not Important	51%

How often do you look at a products label before purchasing it?	Score
All of the time	12%
Some of the time	23%
Never	65%

I am most likely to look at package labeling because: Score	
I want to know who manufactured/made the product	32%

I want to know what the ingredients/contents are	29%
I want to know nutritional information (for food stuff)	20%
I want to know how to use (or store) the product	11%
I want to know whether it can be recycled or composted	8%

In a somewhat unexpected result, slightly more than half of respondents indicated that packaging labels were not important, and more than two thirds of respondents indicated that they never look at package labeling prior to purchasing a product. Of those that do look at package labels, it is often done for reasons unrelated to how that package/product should be managed at its end of life. Only 8% of respondents indicated that they look at package labeling to determine whether a package can be recycled or not. Figure 27 further reinforces these findings, as "Environmental Impact" and "Product/Package Recyclability" were not listed as being pertinent information that should be included as part of a packages label.

Figure 26: What should be included on package labeling (5 = most important, 1 = least important)

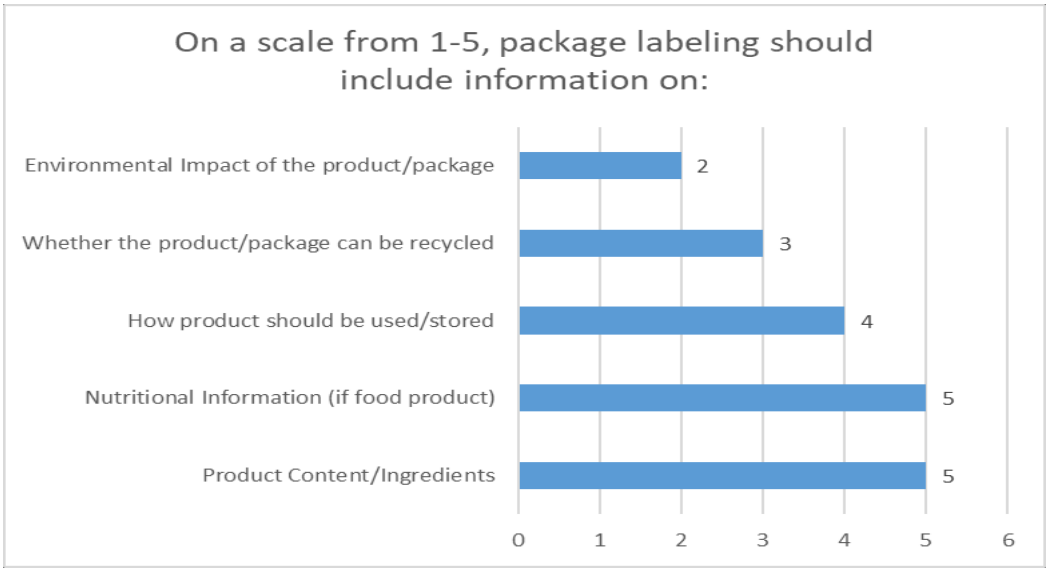
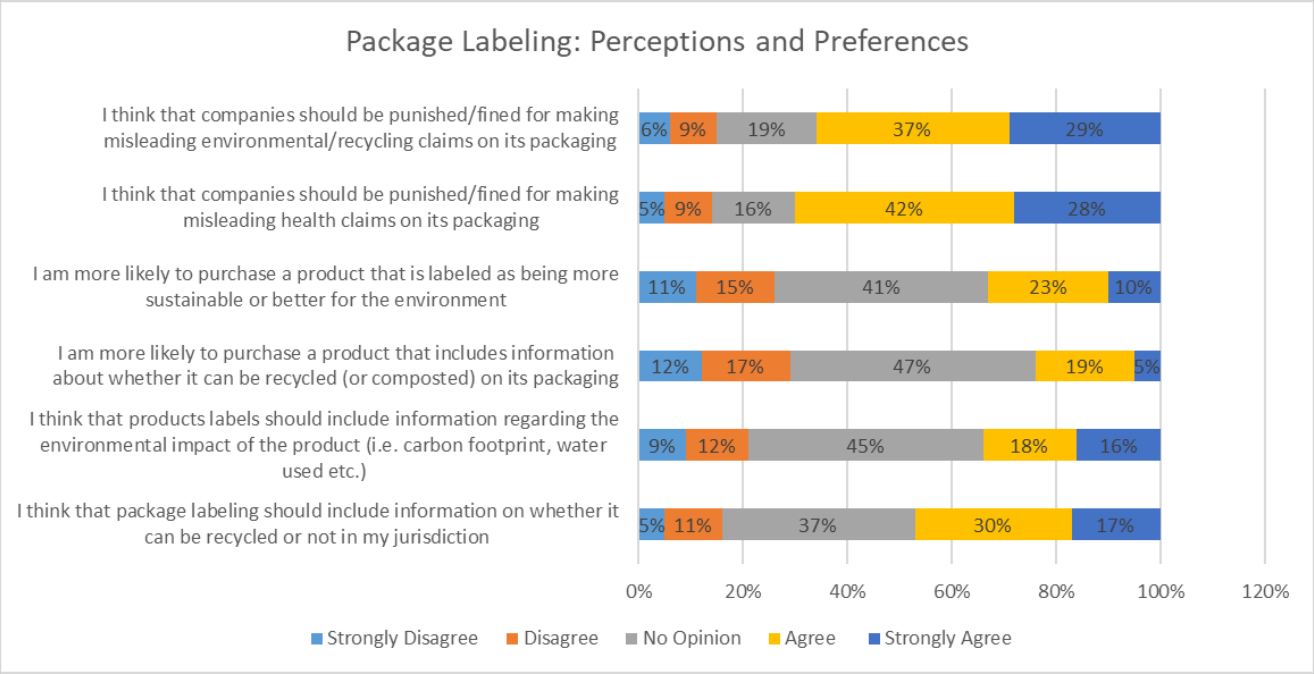


Figure 27: Perceptions and Preferences for Package Labeling



A particularly salient finding is that despite earlier findings that suggested respondent apathy towards the use of package labels, particularly as it pertained to waste and the environment, almost two thirds of respondents felt that companies should be fined/punished for making misleading environmental claims on its packaging. 34% of respondents also expressed a desire for packaging labels to include information on the environmental impact of a product, and almost half of respondents wanted packaging labels to contain information on whether a product can be recycled/diverted in their jurisdiction.

While these results seem largely at odds with earlier findings about the lack of perceived importance of packaging labels, it does suggest that if labels are to be included on a product, they should be accurate (with respect to any claims made) and that it should include information on how to manage the product at its end of life.

6.1 Attitudes Towards Packaging/Product Certifications

Figure 28 below summarizes household attitudes towards environmental product/packaging certifications

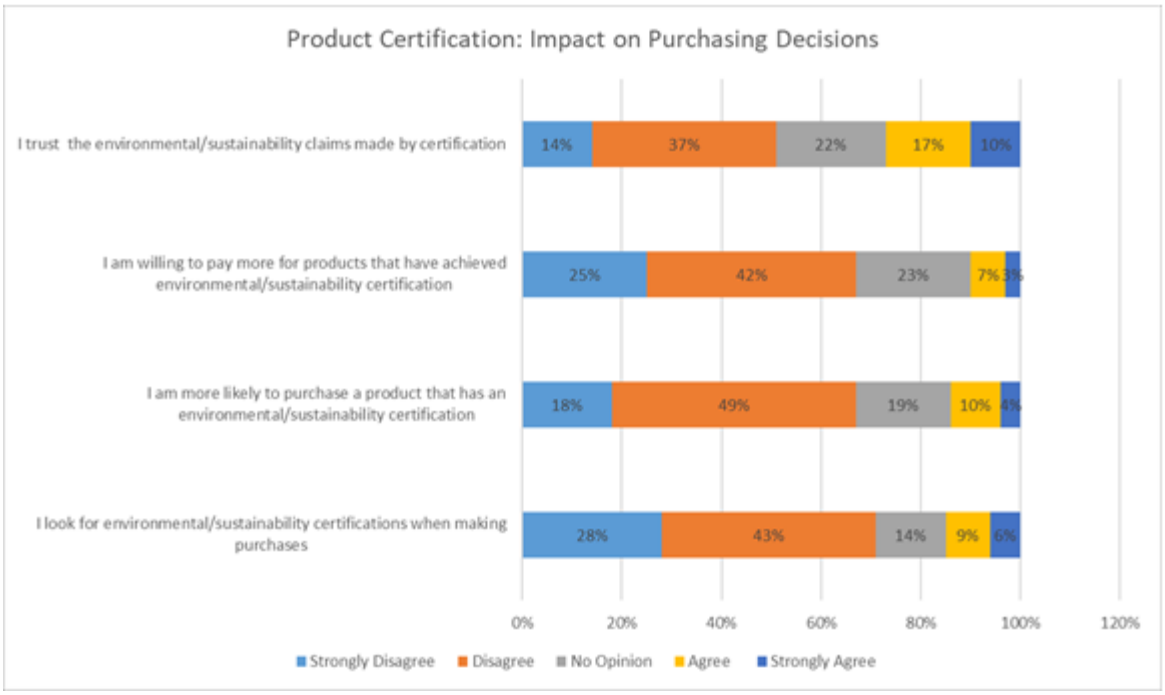
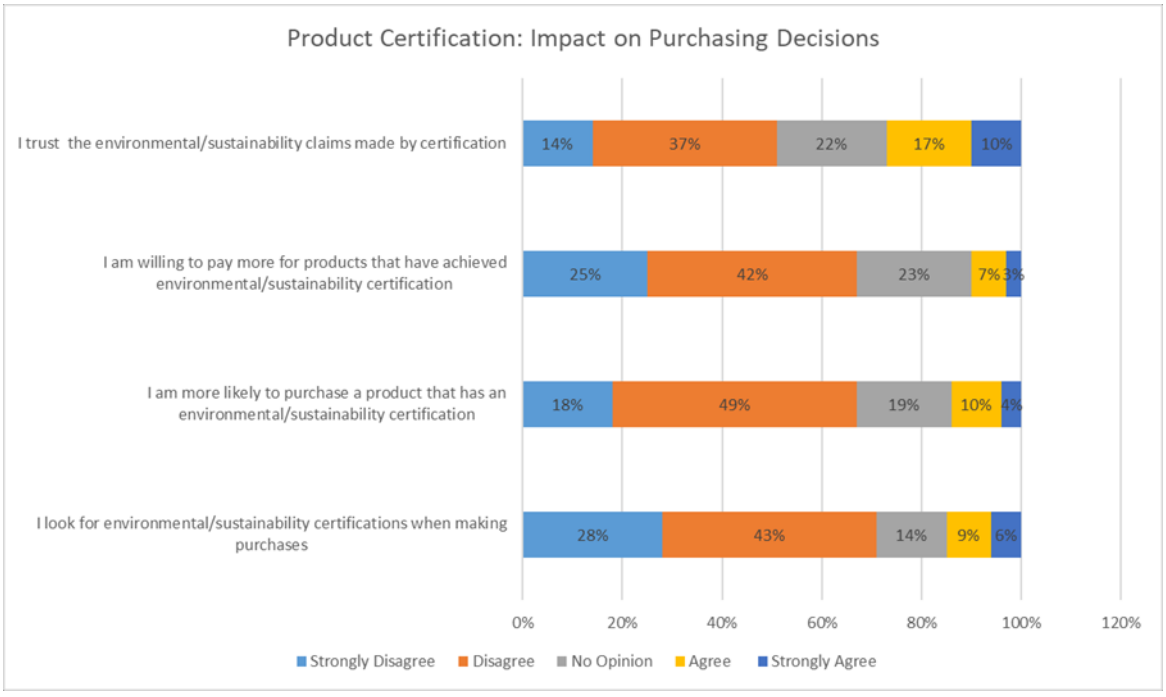


Figure 29. Influence of product certification on consumer purchasing decisions



As shown in figure 29, consumers place little emphasis on environmental or energy certifications. More than 50% of respondents did not trust the environmental claims made by certification, and only 10% of respondents indicated that they would be willing to pay a premium for products that have environmental certification

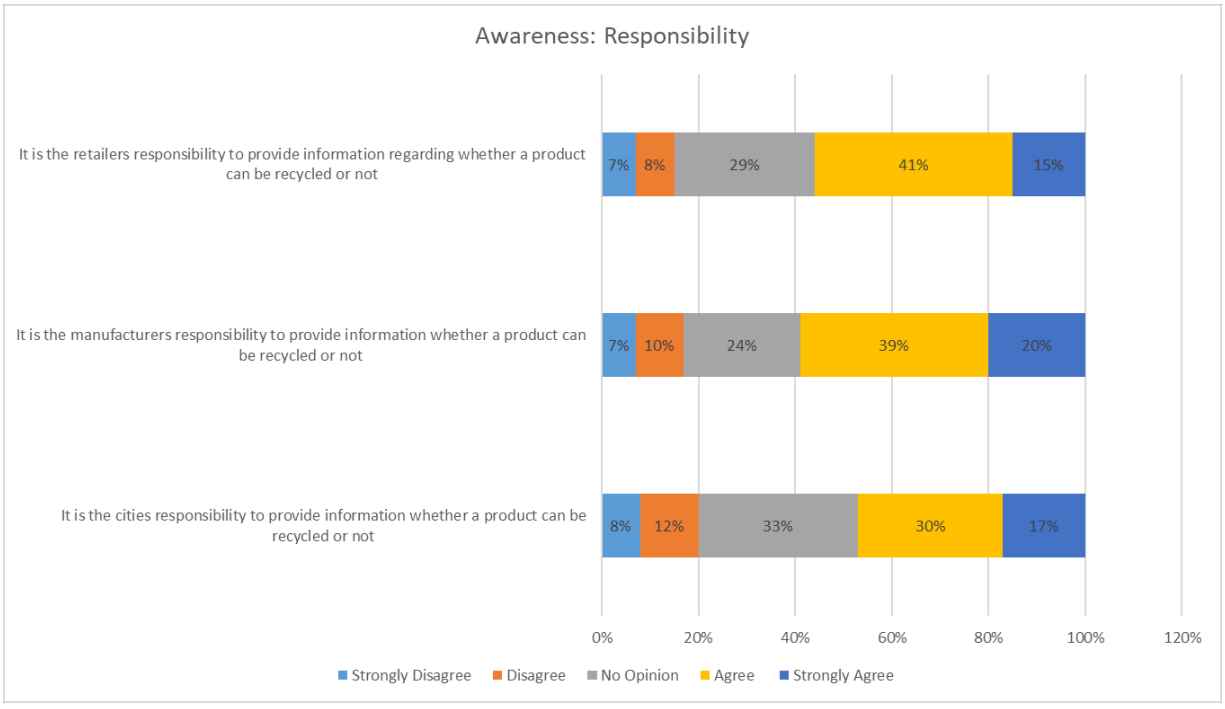
As noted in section 2 of this report there is a significant degree of mistrust among consumers regarding certification and environmental claims in general. The impact of greenwashing has ultimately deteriorated consumer confidence, with no clear indication as to who/what is a reliable source of information. As a result, environmental certifications are met with either skepticism, apathy, or both (only 14% of respondents indicated that they would be more likely to purchase a product that has an environmental/sustainability certification of some kind).

Despite the consumer apathy that was observed in this study, as a whole, consumers want the option of making sustainably informed purchases. While certifications/standards can certainly have a role to play in this process, significant effort needs to be placed on improving the credibility and verifiability of certifications to assuage concerns by the consumer. Whether this is achieved through 3rd party verification, government/regulatory oversight, or some other avenue is uncertain at this time.

7.0 Who should be responsible for educating households about what to do with waste?

Our most recent research confirmed an earlier observation from work conducted in both 2018 and 2020, households have very different expectations about who should be responsible for education and awareness with respect to waste management. Intuitively, our expectation was that households would look towards their municipality or service provider to provide guidance regarding what to do with waste at its end of life. However, when respondents were asked to identify who should be responsible for educating consumers about waste management outcomes, more than 59% of respondents indicated that the manufacturer was responsible, followed closely by retail outlets (56%) and municipalities/cities (47%). These results are shown in Figure 30 below. Individual responsibility ranked last, with only 38% of respondents indicating that it was the consumers responsibility to educate themselves about waste management options and outcomes.

Figure 30. Who is responsible for educating consumers about waste?



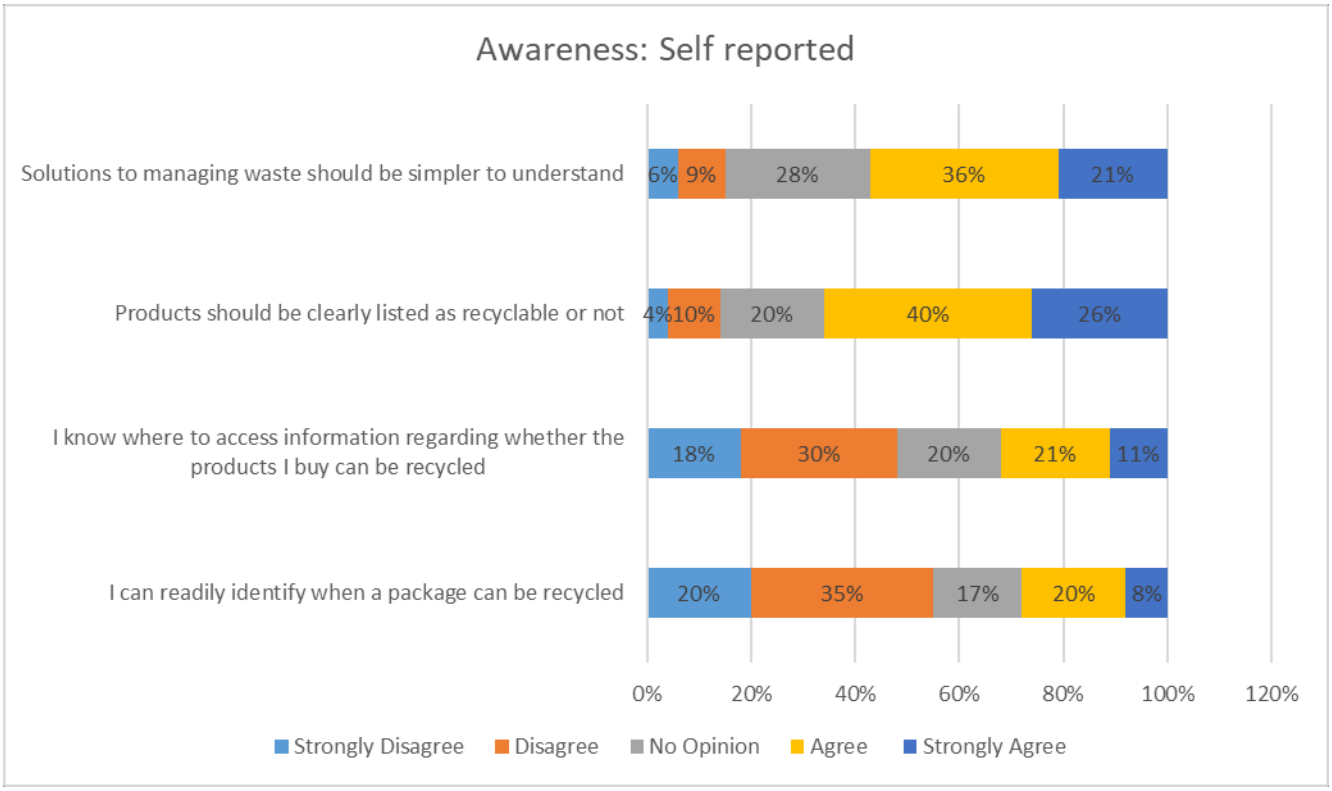
During focus group sessions, respondents indicated that it would be easier to make an environmentally informed purchase if that information was provided at the retail level. Respondents also indicated that information at the retail level could allow for better comparisons when shopping among similar products, allowing them to choose items that they know can be recycled or safely managed at the end of life. It is important to note that while consumers often list "recyclability" as influencing purchasing decisions, this historically has not been the case during actual observational research. Price, quality, brand loyalty etc. all play a greater role in influencing purchasing decisions when compared to the recyclability/divertability of a product.

However, this finding about the role of the retailer in communicating what happens to a product at its end of life opens a potentially new medium for engaging with consumers and increasing awareness, directly at the point of purchase. Based on comments that were made during the open-ended component of the survey, respondents would like to see additional environmental metrics communicated at the retail level. This finding is not as surprising as one would initially think, as there has been an increase in environmentally conscionable consumers who want their purchasing decisions to reflect their personal values.

Other salient findings from the survey are shown in figure 31 below. On average, respondents felt that waste management solutions and outcomes need to be easier to understand, and that packages/products should be clearly listed as recyclable/compostable/divertable. Only 28% of respondents felt that they could readily recognize if a product could be recycled/diverted, and only
31% of respondents felt that they know where to access information about whether a particular product can be recycled/composted/diverted.

These findings suggest that there is an awareness gap that is ultimately acting as a barrier to recycling participation.

Figure 31. Who is responsible for educating consumers about waste?



8.0 Conclusion

While the obstacles to desired waste management behavior (recycling, composting etc.) include a range of factors such as a lack of knowledge and awareness, negative attitudes, inconsistent service and enforcement etc., the primary obstacle remains a lack of convenience and accessibility. Within the context of managing packaging waste, people want to "do the right thing", but may face barriers related to convenience, accessibility, lack of awareness etc. The results of this study suggest that while most households self-report as being concerned about packaging waste and express a willingness to purchase more recyclable/sustainable products, budgetary constraints deter them from making ethical and value driven purchases. , respondents, particularly those living in multi-residential homes and in rural communities, indicated that they often faced barriers to access, which ultimately impeded their ability to participate in sustainable consumption and waste disposal behaviors. It is important to note that "Doing the right thing" and "Wanting to do the right thing" are two very different things, and people should not conflate the two. It is important to note that when most people participate in a survey, they often only consider their attitudes towards the behavior and normative influence. The actual obstacles to participation are removed, which results in participants "idealizing" their responses.

This finding has been observed in numerous other studies, but the most important learning from our recent work is that a lack of perceived behavioral control (the ability to actually carry out a desired behavior) will largely negate any efforts to increase awareness, cultivate favorable attitudes, or normative pressures from the community/municipality. In fact, when measures of attitudes and awareness are high, but perceived behavioral control is low, it results in something called cognitive dissonance. In the simplest terms, cognitive dissonance (as it pertains to waste) refers to negative attitudes that arise from wanting to do the right thing, understanding the importance of performing the action, but being unable to do so because of an infrastructural or accessibility barrier. If cognitive dissonance persists over time, there is a risk of people becoming resentful of the desired behavior, as formerly positive attitudes now become negative.

Lack of convenience and accessibility are also seen as a manifestation of socio-economic inequality – in the broader literature, there is an extremely strong correlation between income levels and access to environmental amenities and infrastructure.

The results of this study suggest that households want packaging that can be sustainably managed at the end of life. The issue however is that most people as well as policy makers conflate recyclability with sustainability, and don't readily associate other end of life options as being a viable alternative to recycling.

Participation in residential recycling programs is likely the earliest experience in trying to be good environmental citizens, which has resulted in both a behavioral and policy emphasis on the last of the 3Rs. Now, more than ever, we need to take a step back and think mechanical recycling and focus on promoting systems that are either better equipped to manage light weight multi-resin packaging (i.e. chemical recycling/gasification) or prioritize reusability and packaging reduction.

Educating consumers and cultivating awareness about the benefits of other end of life waste management options will be an enormous challenge, as it will require a fundamental shift in how consumers view packaging waste. However, it is a challenge worth embracing – if we indeed want to move towards a circular and zero waste economy, we must use all of the tools available to us, of which recycling is only one.

APPENDIX A: Interregional variation in attitudes towards packaging and packaging waste

One of the secondary objectives of this study was to better understand how, if at all, locality affects attitudes towards packaging, packaging waste and the environment. While there is a relative paucity of literature that specifically examines this question, there is a general consensus in the broader academic literature is that locality does influence attitudes towards the environment and individual stewardship. However, these differences are not explained by locality alone, but other socio-demographic factors that are correlated with locality (i.e. income levels, infrastructural access, demography etc.).

As noted in Section 1, survey participants represented households from both the United States and Canada - a stratified sampling strategy was used to ensure that study participants were representative of both Canadian and American households, accounting for socio-demographic differences and spatial characteristics where possible.

Data was collected over a 24 week period, with survey and focus group pretesting beginning in January of 2022. A total of 1960 surveys were conducted during this time.

Survey participants broken down by geographic region are described below:

- US East: 28.2%
- US West: 24.7%
- US Central: 18.9%
- US South: 12.6%
- Canada: 15.6%

***Note:**

US East includes the states of: NY, YT, NH, MA, CT, RI, NJ, PA, WV, VA, MD, ME, MI, OH, KY, IN US West includes the states of: WA, OR, CA, NV, UT, AZ, ID
US Central includes the states of: MN, MT, ND, WY, SD, NE, KS, CO, NM, OK, TX
US South includes the states of: AR, LA, TN, AL, MS, GA, SC, NC, FL
Canada includes the provinces and territories: BC, AB,SK, MB, ON, QC, NB, NS, PE, NL, YU, NT, NU

The results shown below represent a selection of questions related to attitudes towards packaging, plastics, awareness, purchasing preferences and consumer trust. Regional comparison of attitudes towards packaging and plastic waste

Statistically significant variations existed across sampled jurisdictions, with attitudes towards packaging waste (i.e. concern about it's impact on the environment, individual contribution to the packaging waste problem etc.) observed to be higher in US East, US West and Canada. Both Central and Southern United States reported responses that were one standard deviation lower than the Bi-National Average in 4 of the 5 questions asked.

As shown in figure 2, a similar result was observed with respect to attitudes towards plastics and plastic packaging. Of note, all regions reported high levels of concern with respect to the potential impact of plastic on the environment and human health, but no group demonstrated a strong willingness to avoid purchasing/using plastic products, or support for a blanket single use plastics ban. While these results cannot be fully explained exclusively using the data gathered, anecdotes taken during our focus group sessions suggested that people recognize both the ubiquity and importance of plastic packaging in their day to day life, but also acknowledge the potential environmental impacts associated with plastic waste.

*Percentage of respondents who agreed or strongly agreed with the statement)

Fig 1. Regional comparison of attitudes towards packaging waste

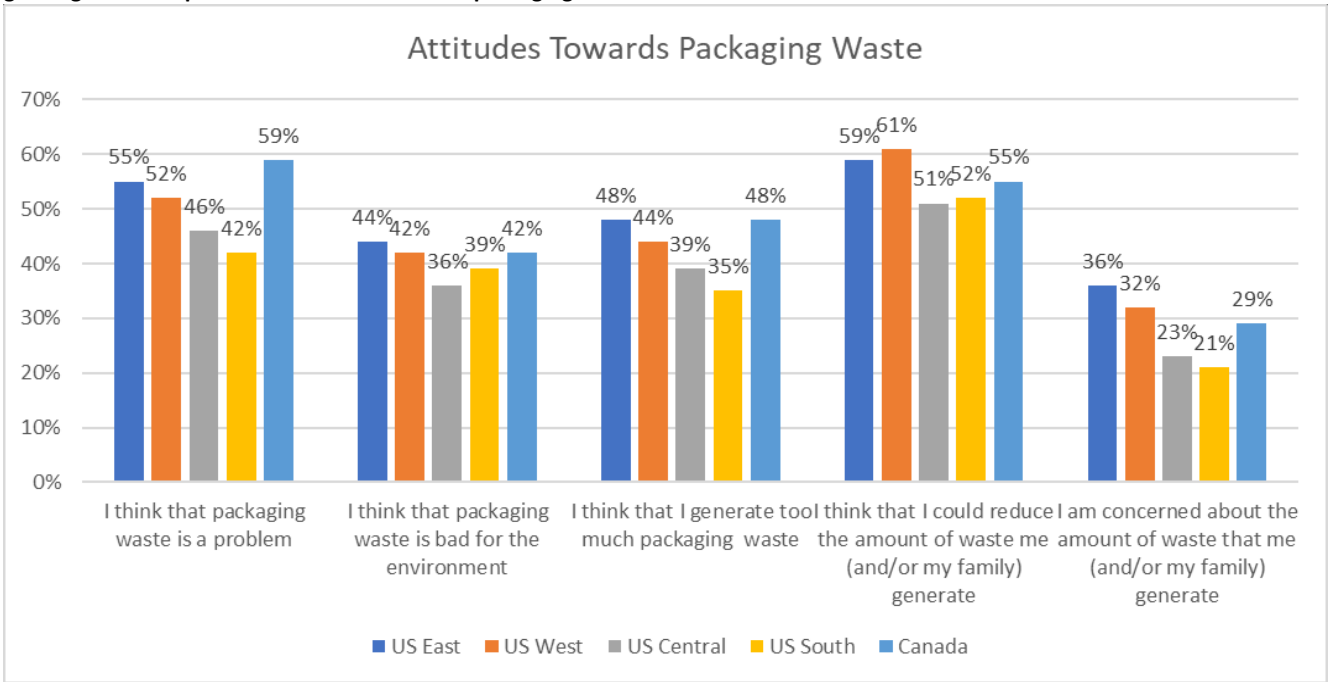
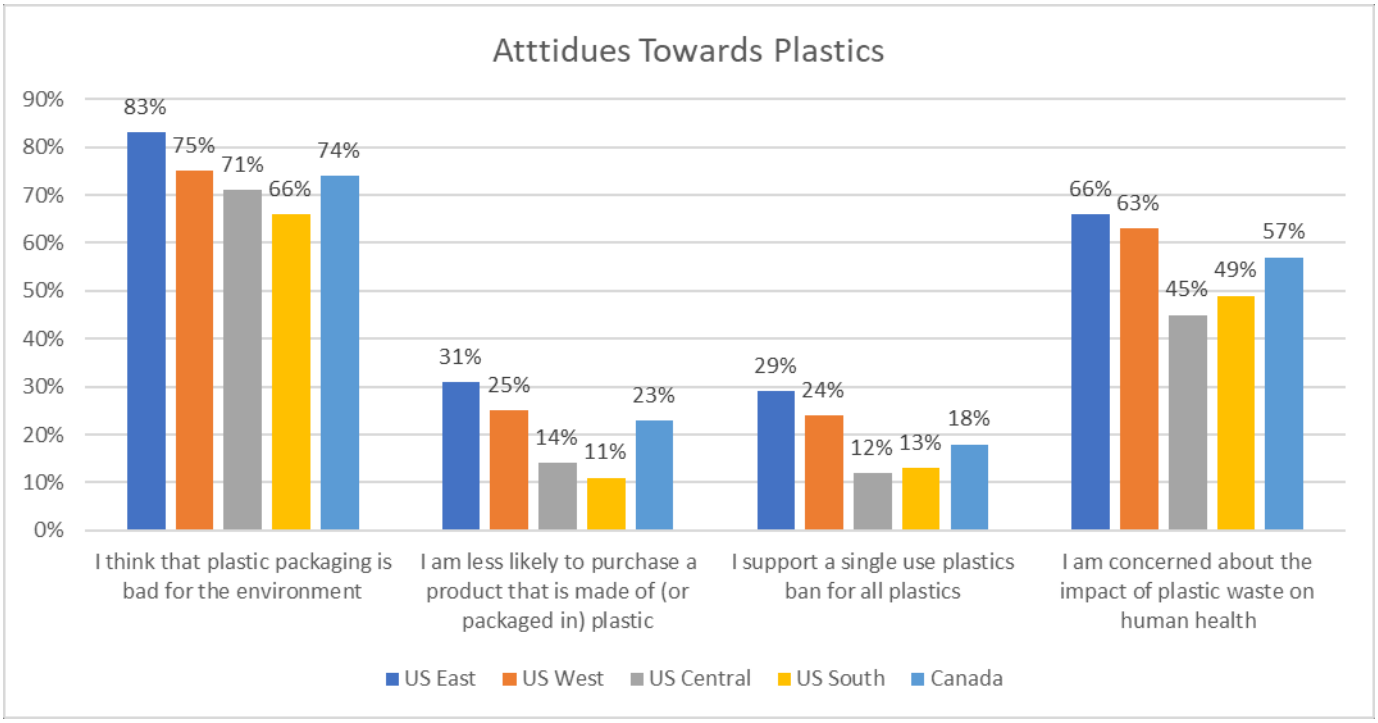


Fig 2. Regional comparison of attitudes towards plastic waste



Both figures 3 and 4 below show that once again, there is a statically significant difference in responses across regions, with results consistent with our previous findings. Respondents from US East, West and Canada indicated a stronger willingness to seek out products that can be more readily be recycled, and indicated that they would be more willing to pay a premium for said products (when compared to US Central and South).

However, looking at the result more closely, while all groups did indicate a potential preference for more sustainable/recyclable products, no region showed a strong willingness to pay a premium for more environmentally sustainable/recyclable products – bi-national averages were less than 30% for each question, dropping to as low as 10% in regions such as the US South.

Fig 3. Regional comparison of attitudes purchasing preferences

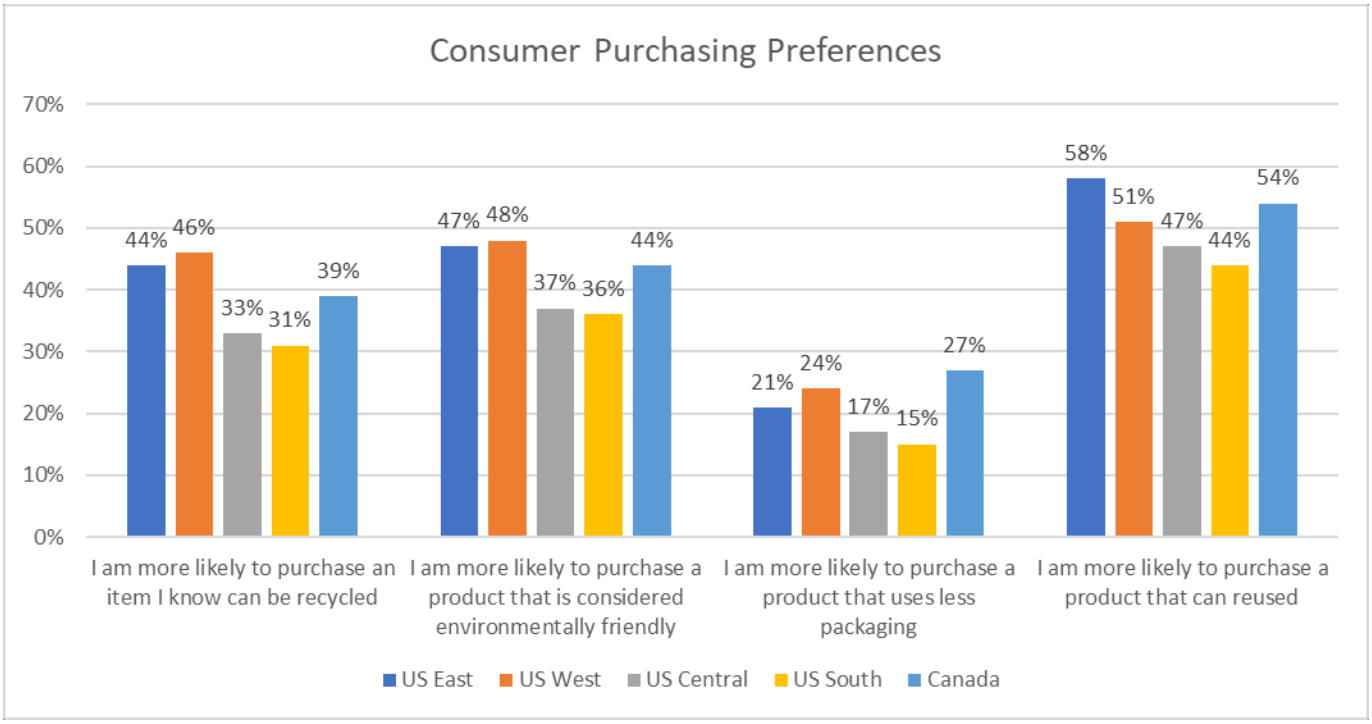
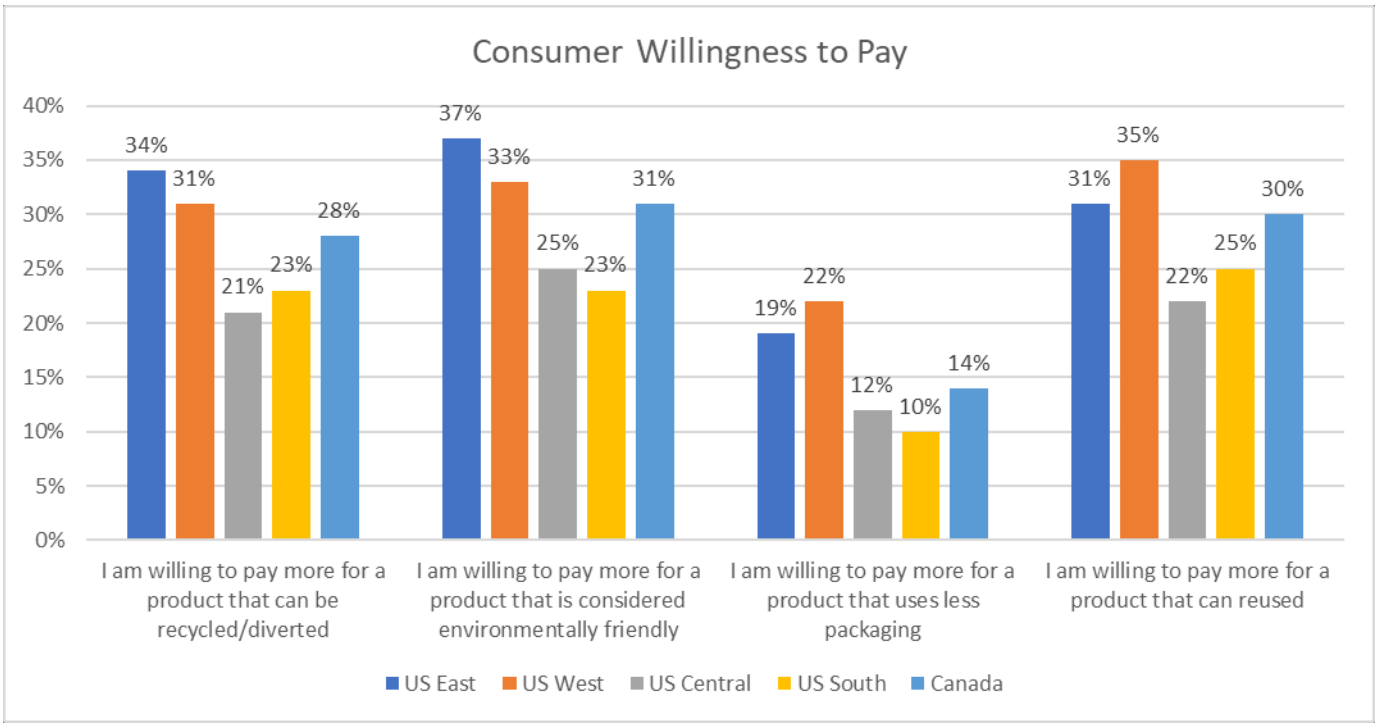


Fig 4. Regional comparison of consumer willingness to pay



Regional Comparison of Consumer Awareness and Trust Regarding Manufacturing and EOL claims

As shown in figures 5 and 6 below, out of all of the sections included in this study, the greatest disparity in responses across regions occurred for questions related to consumer awareness, and consumer trust (both with respect to claims made by manufacturers, as well as how waste was being managed at its end of life.

Both South and Central United States reported significantly lower levels of household awareness regarding identifying recyclable packaging and knowing where to access information regarding whether products/packages could be recycled. In some instances, respondents from consumers located in the US East and West reported double the levels of awareness relative to other areas,
a result likely explained by disparities in infrastructural access across regions.

In Table 1, a list of commonly used environmental terms (broken down by regional responses) is shown. Respondents were asked if they were familiar with the term, and asked to respond "Yes, No, or Somewhat". The results shown below indicate "No" responses. As an example, when asked if respondents understood the term carbon neutral, 66% from the Central US reported No. There are two primary take aways from these results – 1) The vast majority of respondents struggle to fully understand common terms that are ubiquitous in discussions surrounding packaging and waste, and 2) There are significant differences levels of terminology awareness across regions, with US Central and US South reporting the lowest levels of overall awareness relative to all other regions included in the survey.

Awareness Terminology					
Respondents who indicated "No" to understanding the following terms	**US East**	**US West**	**US Central**	**US South**	**Canada**
Zero Waste	24%	26%	31%	37%	25%
Carbon Neutral	51%	58%	66%	69%	61%
Life Cycle Impacts	60%	53%	62%	71%	56%
Green House Gases	57%	51%	67%	69%	50%
Carbon Footprint	51%	44%	63%	68%	47%
Producer Responsibility	73%	72%	85%	87%	63%
Recycling	0%	0%	0%	0%	0%
Chemical Recycling	71%	77%	85%	90%	76%
Advanced Recycling	69%	76%	84%	84%	71%
Composting	11%	12%	8%	10%	7%
Waste to Energy	26%	28%	21%	19%	23%
Reuse	5%	8%	7%	11%	9%
Reusable Packaging	16%	14%	19%	15%	16%

Green Washing	27%	35%	40%	44%	39%

While it is problematic to offer commentary using broad generalizations, on average, communities located in South and Central United States have lower levels of access to residential recycling programs. Given that consumer awareness is a direct function of habituation (the ability to participate in a behavior), the results of this survey are not surprising. Generally speaking, we would expect to see a normalization in levels of awareness as communities are provided similar levels of access to waste management infrastructure and programming.

A particularly interesting finding is that all regions felt that cities, product manufacturers and retailers should play a role in educating consumers by providing information on the recyclability and environmental impact of their products.

Levels of trust regarding environmental/recycling claims of manufacturers, as well as what is happening to waste at its end of life were relatively low across all regions. However, in a somewhat unexpected result, both respondents from the South and Central US expressed higher levels of trust when compared to all other regions. It is not entirely clear why this was the case – intuition would suggest that households in communities which have inferior access to waste management services would be less trustful, but the opposite was observed in this study.

Fig 5. Regional comparison consumer awareness

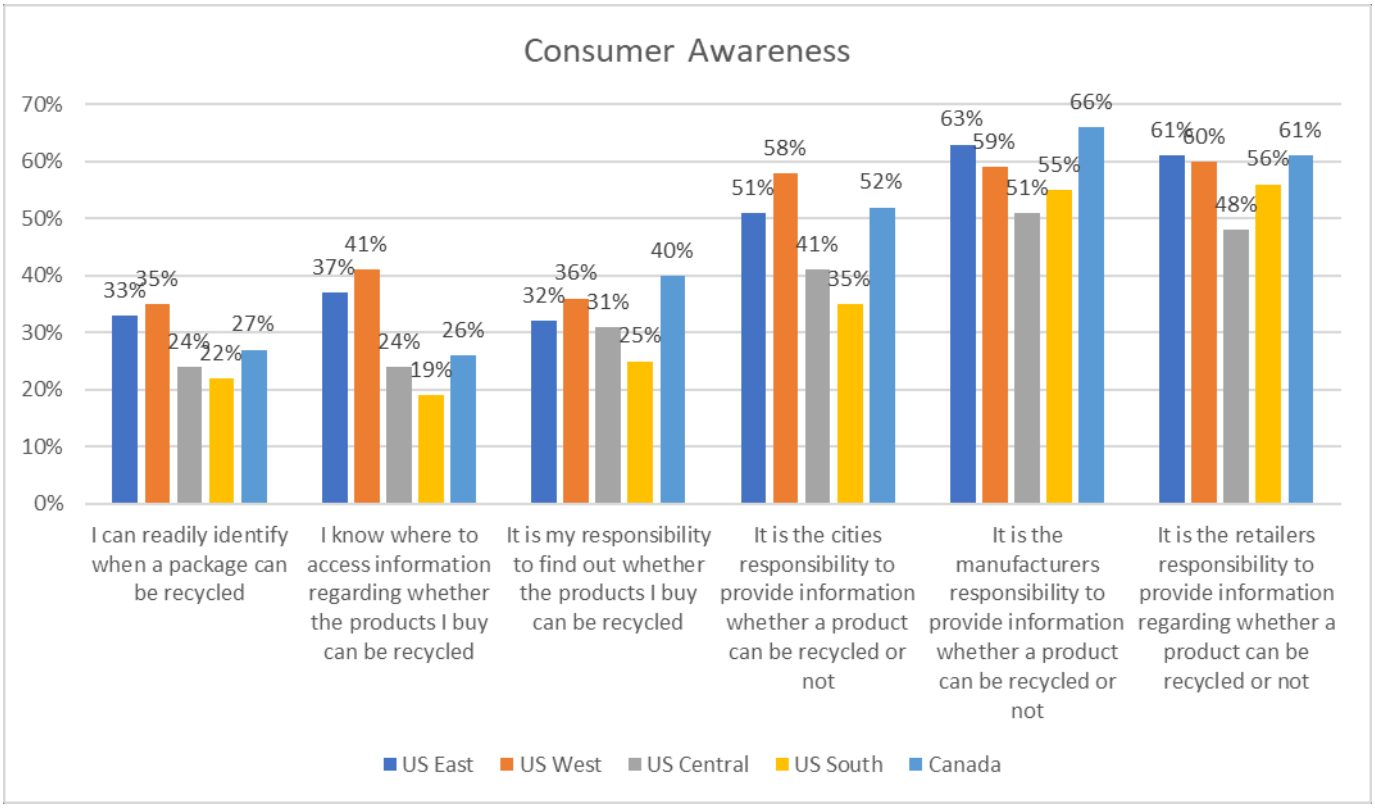
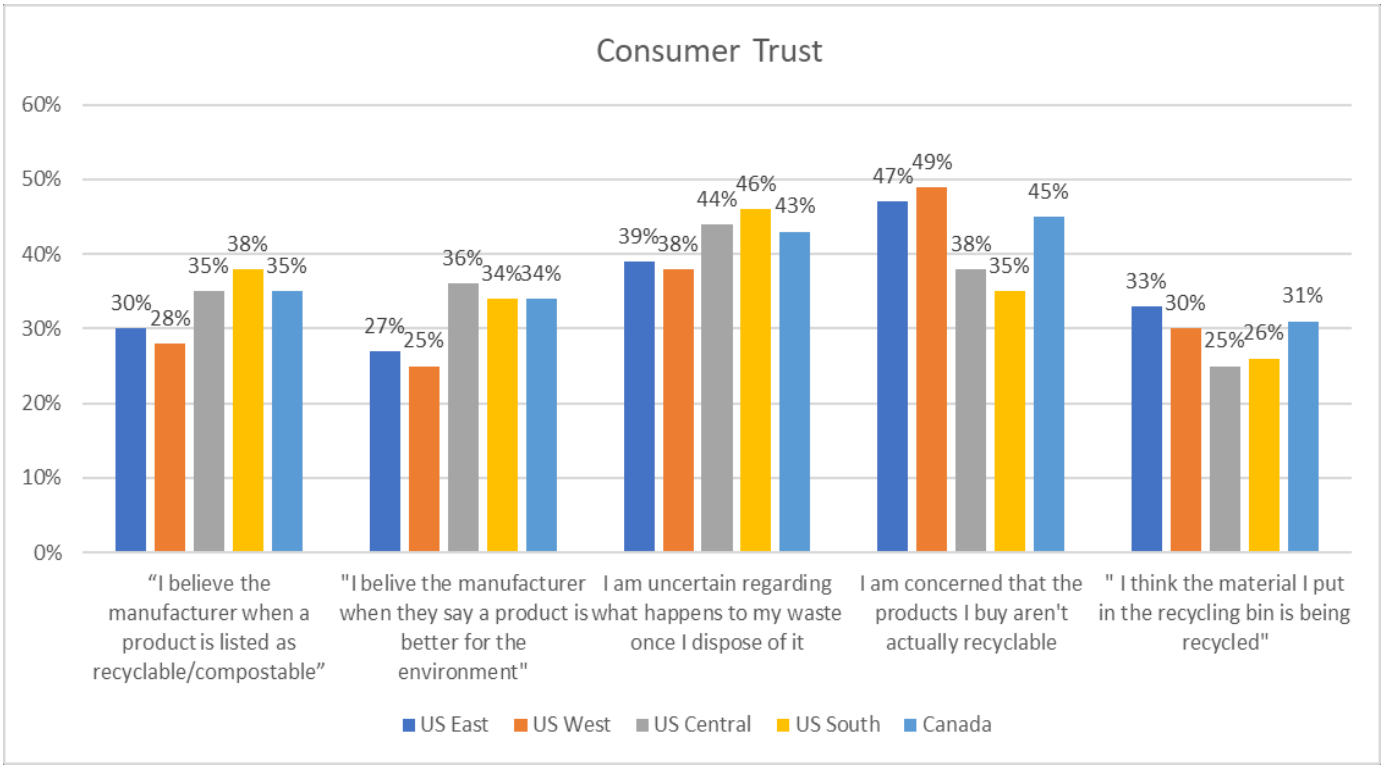


Fig 6. Regional comparison consumer trust



APPENDIX B: Demographic analysis of factors affecting waste generation/division and participation in recycling programs

Table 2 below summarizes factors most likely to influence attitudes towards packaging waste, as well as rates of waste generation/diversion based on the demographic analysis conducted during this study. Variables denoted with a star indicate "high impact" variables – it is difficult to rank these ordinally, as there is no consistent evidence in either the data or broader literature that suggests one variable as being clearly more important than others.

Table 2: Factors affecting waste generation

Factor	Impact
Income ***	Positively correlated with awareness, waste generation and participation in recovery programs
Age	No discernable relationship with attitude towards packaging and packaging waste. Positively correlated with waste generation and recovery (until age 65, where generation per capita decreases and recovery per capita
Gender	Woman demonstrate higher self-reported levels of concern for packaging, packaging waste, and the overall impact of packaging on the environment. Men Generate more waste per capita, while woman divert more waste per capita

Population Density	Positively correlated with waste generation (and recovery). No discernable *direct* relationship with attitudes towards packaging and packaging waste

	(although those who live in cities tends to have higher levels of awareness)
Education	Positively correlated with self-reported concern for packaging, packaging waste and broader issues surrounding sustainability. Positively correlated with diversion and participation in source separation programs
Immigration***	Associated with low levels of packaging and waste management awareness/concern in general. First generation immigrants are less likely to participate in source separation programs, resulting in lower diversion rates per capita. Associated with a lack of access and lack of familiarity with local infrastructure and programs.
Locality ***	Strongly correlated with attitudes towards packaging and packaging waste. See Appendix 1.
Access to Curbside Collection (waste/recycling) ***	Strongly correlated with both attitudes towards packaging, packaging waste and EOL waste management outcomes in general. Access to curbside residential recycling is the most significant predictor of recycling participation.
Dwelling Type ***	Single family households generate and recover more waste than MF households (Functionally related to access to curbside recycling collection)
Bin type	Households with access to curbside carts generate and recover more waste per capita
Pay as you throw/Bag limits ***	Presence of bag limit/PAYT decreases waste generation per capita, and increases recovery per capita. While this study did not have sufficient data to demonstrate a relationship between PAYT and attitudes towards packaging and packaging waste, anecdotes taken during focus group sessions suggest that restrictions on quantities of waste disposed result in people thinking about packaging design (excess packaging in particular)